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THE
INDUSTRIAL
PERSPECTIVE

**Conference Proceedings
Meeting Minutes**

Sponsored by

**THE SHIP PRODUCTION COMMITTEE
PANEL SP-8 INDUSTRIAL ENGINEERING**

**THE SOCIETY OF NAVAL ARCHITECTS AND MARINE ENGINEERS
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FOREWORD

This volume contains proceeding of the Panel SP-8 Industrial Engineering Conference 89 and the minutes of their working meetings, jointly sponsored by Ship Production Committee and the Society of Naval Architects and Marine Engineers, September 11-12, 1989, in Arlington, Virginia.

The Ship Production Committee is unique in that it oversees the National Shipbuilding Research Program. This is a cost-shared effort among the nation-s shipyards, which in the past has been administered through the U.S. Haritime Administration with funds supplied by the U.S. Navy. The Navy is currently in the process of assuming the Haritime Administration's role in the program. This Committee essentially functions without utilizing any of the Society's research funds.

The Committee is chaired by Jesse W. Brasher, and consists of ten panels, grouped into areas of similar disciplines. The Design and Engineering grouping covers outfitting and production aids, design production integration, and marine industry standards. Production Processes oversees coatings, welding, and flexible automation while the third grouping, Resource Management considers facilities and environmental effects, shipyard organization and personnel, industrial engineering, and education.

The work of this Committee is dedicated to reducing the costs of shipbuilding, overhaul, modernization, and repair, while seeking development, and implementing new ideas, techniques, and equipment in the shipbuilding industry and processes.

Gary Higgins
Chairman
Panel SP-8
Industrial Engineering

Zbigniew Karaszewski
Chairman
Industrial Engineering
Conference '89

PROCLAMATION

PROCLAMATION

We the undersigned hereby proclaim the third annual

**NATIONAL SHIPBUILDING AND REPAIR INDUSTRY
PRODUCTIVITY IMPROVEMENT WEEK
SEPTEMBER 10-16, 1989**

The campaign objectives are to demonstrate our industry's cooperative initiative and commitment to achieving continuous productivity and quality improvement; to heighten the industry-wide awareness of the need for, means to, and benefits of this improvement; and, most importantly, to stimulate action to achieve improvement throughout all aspects of the industry.

A partnership of management - government - labor to improve productivity is one fundamental element of a long term strategy to mutual goals and benefits, including competitiveness in the international market, and establishing a commercial shipbuilding capability in the United States.

The National Shipbuilding Research Program exemplifies how success can be achieved by all working together. Therefore, this year's campaign is in conjunction with the 1989 Annual NSRP Ship Production Symposium to be held 13-15 September. The Symposium will offer actual examples, information, and ideas for improving shipyard productivity.

We must all accept the challenge and responsibility to improve productivity, make improving the process and product a proactive part of all we do, and continuously strive for excellence. This can best be done with a comprehensive initiative, from capital investment to participative management, and from technology exchange to training.

Please, spread the productivity challenge, promote productivity awareness, and generate productivity improvement initiatives.




Paul J. Burnsky
President, Metal Trades
Department, AFL-CIO




John J. Stocker
President, Shipbuilders
Council of America



RADM Dean H. Hines
Deputy Commander for Industrial
& Facility Management, Naval
Sea Systems Command



William A. Creelman
Deputy Administrator, Maritime
Administration, U.S. Dept of
Transportation



Jess W. Brasher
Chairman, NSRP Ship Production Committee

Note: For further information on the campaign or improvement, contact NSRP Panel SP-8 Chairman at (414) 743-5577 ext 341.

COMMERCIAL VALUE OF CLUSTER B - A CRITICAL LINKAGE FOR THE
SURVIVAL OF OUR SHIPBUILDING BASE BY MR. DALE ROME

It is a foregone conclusion that the number of ships our Navy will build over the next decade in order to sustain the fleet size will be far less than that required to meet the goal of a 600-ship Navy over the past decade. With fewer Navy ships to build, and technological and economic pressures limiting the number of active Navy shipbuilders, more shipyards will disappear. Every piece of evidence that I have seen confirms that U.S. shipbuilding overall is in a disastrous state of decline. Over the past decade many shipyards have disappeared, many more are on the verge of financial ruin. Current projections of planned construction, overhaul and repair work from both the public and commercial sectors can never sustain the industry at a level which would be adequate for national defense. If more than five or six shipbuilding yards are required to assure an adequate mobilization capability into the next century, then a merchant shipbuilding program must produce most of that market for U.S. shipyards. However, the non-Navy segment of the industry will disappear in one to three years if immediate action is not taken.

I realize that there are many decision makers within the Navy that feel we are not responsible for doing anything more to enhance or sustain U.S. shipbuilders; however, future Navy shipbuilding budgets will be under increasing congressional scrutiny and as a result, ship research and development will be subject to severe budget constraints. With these factors in mind, it appears to be in the mutual interest of DTRC, the Navy and the shipbuilding industry to identify, develop and promote the potential commercial value of many of the technologies associated with Cluster B. This linkage should help us obtain the support of the Shipbuilders' Council of America and the Maritime Administration and thereby provide the leverage needed to secure congressional funding support for Cluster B.

Considerable Jones Act tonnage is in need of replacement. Forty percent of the tankers are already over twenty years old. Ninety-four tankers of 4.5 million GRT will be over twenty years old by 1994. The double hull structural "concept, which is one of the foundation technologies of Cluster B, has tremendous commercial potential for high performance product oil carriers. The unidirectional girder structure provides cargo tanks fully isolated by a double hull and results in interior surface that are completely flush, which is ideal for product oils. This concept would increase the cargo handling efficiency and improve cargo purity by reducing cargo offloading time and enabling simpler and faster tank cleaning methods that could readily be automated. This would permit quick and contamination free changes of cargo from one type of product oil to another.

Although a detailed description of all the commercial advantages of the unidirectional girder structure and double hull concept of Cluster B is beyond the scope of this paper, a brief outline may serve to illustrate its viability as follows: greatly reduced number of structural discontinuities; greater hull resistance to stranding and collision; simplified construction, inspection, maintenance and repair; reduced time for unloading, cleaning and stripping; improved cargo purity; total segregation of cargo and ballast.

In the wake of the disastrous Exxon Valdez accident, Senator Brock Adams (D-Wash.) introduced a bill on April 19 of this year that would require double bottoms and double hulls on all new tankers operating in U.S. waters. Perhaps now is the time for the Navy to join forces with industry and other government organizations to support the Shipyard Recovery Plan and the revitalization of commercial shipbuilding in America. Expanding alternative markets will provide building yards with the impetus needed for investment in productivity improvement and capital equipment. If the proposed effort is successful, all of us will benefit from this partnership.

PROCEEDINGS

of

Industrial Engineering Conference

September 11, 1989

INDUSTRIAL ENGINEERING: THE EDGE TO GLOBAL COMPETITIVENESS

By : Greg Balestero

I am both the incoming and not soon to be outgoing Executive Director of the Institute of Industrial Engineers. The reason why I am here is because Gary Higgins invited me out to stop in and talk to you specifically about the profession of Industrial Engineering and what is happening in industry today with industrial engineers. Now I roll out as being the Institute of Industrial Engineers with industrial engineering dates back to 1949 when the organization first sprouted its wings. Its involvement commercial shipbuilding and again with the Navy is not new. Our involvement with commercial shipbuilding began in 1977 and 78 when the ship producibility program was born and we were certainly one of the first of the SPA program. In the mid 1980's when the Navy began to encourage and implement our industrial engineering techniques in shipyards. I personally had the opportunity with working with NAVSEA in a period of 1 year and visiting some shipyards and helping NAVSEA develop a program on introduction industrial engineering and an opportunity to visit several of the shipyards as well as meet some of the individuals in this room. So it is a pleasure to come back here and certainly a real pleasure because we are right on the heels of our Toronto conference and our awards banquet where the Navy is certainly recognized for their accomplishments and productivity improvement. A Norfolk Naval shipyard received our excellence and productivity award for last year and Admiral Horn received our excellence in management award. Both indications of their contributions through their performance in the yards. So

it is a real pleasure to be here. What I would like to talk to you about today is competitiveness and the industrial engineer's role in competitiveness. This is something I talked about for a year and I feel is the key link that the industrial engineer can facilitate in industry and regardless of where that industry is, whether it is the service sector, the manufacture sector, or the public or private sector. Industrial engineer today plays a very key link in that competitive aspect. Competitiveness in competition is something that kind of alludes everybody. Everybody can possibly gain about competitiveness but they are really not sure where that comes from or what that means. One of the reports that I have read that is pretty interesting was published by the National Academy of Engineering. It is called the Technological Dimensions of International Competitiveness. ANE is an organization made up of the readers in engineering and science throughout the United States. The study of a variety of different aspects of technological industries and came up with two basic facts about competitiveness. They said that competitive that manage belongs to the company that provides them customer with a product or service that has value better than that its competition. Makes sense. Pretty simple thing to say but value is a key element here. For those of you that are now in a manufacturing sector for any length of time realize that it is more than just the least costly element. It's cost, performance, quality, reliability, service is very complex issue to measure anymore. The second thing was that most of the competitive companies today are rapidly responding to changes to customer demands. That is their organizations, their

manufacturing or service element is responsible and flexible. It has to move quickly. When the customers needs change, the product has to change. If the demand changes, the product has to change and the level of production has to change whether being in the service or the manufacturer. Obviously that is not a easy task to accomplish. Those of you who ready Fortune magazine a couple of issues ago got to read a article about IBM Corporation and John Yankers their 54 year old CEO news up and coming CEO. Believe it or not IBM has been in trouble for about 6 years. Why they are in trouble is because they lost about 25 - 30 percent of their market share, main frame market to depth. Digital Equipment Corporation just ate their lunch and very gradually the IBM on the shop floor disappeared and in its place came the depth. When John Yankers took over he said we have got to have a change in heart. We have been running around solving problems that were IBM-S than the customers and he said well what we have to do is become clearly a company that is the world champion in meaning the needs to their customers. Now the **AS**400 which many of you are going to hear slot of if you have not already is there new system. That was developed in a unique way. They used interdisciplinary engineering needs to develop that. These speech therapist work with software vendors and they bring in teams of software vendors that were not IBM'S. They set up a council of customers that help analyze and develop the product and by the time IBM will lease that product they have 1700 systems in the field tested. It was launched with a 1,000 software applications. Was it successful? They sold 25,000 systems in 11 months, 3 billion dollars. They reclaimed about

1/2 to 2/3 of the market share that they lost. Now that's not a mainframe but it's powerful enough to replace many of the mainframe applications that were previously done. Obviously we are on all IBMs but IBM faced the fact that they were not being responsive to customer needs and realized quickly that their production value was not there. The product value mix. Today, taking a look at that NAE report, NAE said the same thing. Basically what we are going to have to do in order to have a competitive organization of people that are going to be team players in the competitive organization. The organization is going to have to integrate all resources. Second thing they are going to have to do is that they are going to have to make sure that all employees participate in this process. Third the companies are going to have to develop a focus on the interchanging preceed value in the product. Now that's an analysis of some 400 firms in the U.S. that are globally competitive in our leaders in their field. It is not something that I hypothesize. It's digesting in several volumes of information and research. Sensually what they said organizations today have to take on 3 basic elements. One is the they have to focus on a project product realization process. And what they means is that no longer we have specific disciplinary teams. It won-t be an industrial engineering function. It won-t be a design function. Everybody who works on a team will realize the product from beginning to end and it will become part of a team process to solve it. Sensually it is the integration of all resources. To put in simple terms and to try to translate it to the Navy it means in terms of commercial shipbuilding that may

some day have an eye sitting next to naval architecture and helping design the product. In terms of the Navy it means perhaps having an industrial engineer sitting next to the organization that does work package planning on ships and from the fleet. It won't be, at least in these competitive firms, the near dream of the future there won't be interdisciplinary value. The second thing is employee Involvement and I know that the Navy and commercial shipyards both have made some great games in quality control circles and also productivity action teams and performance action teams. With getting the employees to tie into one large mission and understanding their role and achieving that mission is crucial. IBM did it with the aid of AS 400 and us successful and that's the kind of employee involvement it is going to take. And the last thing the NAE group felt was that the organizations have to have a commitment to continuous improvement. Now continuous improvement is simple to say. It means that success is never final. Will Marriot who is the chairman of the Harriet Corporation spoke in the 1988 annual conference said that's a goal that he enstills in all his management team is that success is never final. You have to keep trying. Just when you think you have it right you have to say it is not right you can do better. And that's an element that seems to represent these companies that are successful. Product realization process and employee involvement and continuous improvement. Question is for IEs, whether they are in Navy, shipyards, whether in commercial shipyards working for IBM, working for American Express, are they really capable of taking leadership and designing and developing and implementing this

integrated approach, the product realization process. What role can they play and are they prepared for. Secondly they understand and can develop systems from employee involvement. And third probably more importantly that they understand the characteristics necessary to make a commitment to continuous improvement. If the answer to those questions are no, industrial engineers don't belong in a role of trying to make the company more competitive. Now obviously I wouldn't believe, I wouldn't be here if I thought the answers to those questions were no. To me, the answers to those questions are yes. Not to preach to the choir but that's the definition of industrial engineering and not to repeat it to you but the key words here are design, improvement, systems, and people. Bias definition of industrial engineers today, tomorrow, last week take on that role of being involved in the process that we talked about in terms of competitive links for the organization. Now whether or not we achieve it personally, whether or not we are successful in fulfilling all the parts of that definition are still questionable. We are certainly trained to do so and as a goal half that is a personal mission. We receive IIE is basically a communication center and you can get in about 5,000 pieces of mail a week and about 25-2800 phone calls a week. Many of them are complaints that we are not doing our job. Many of them are success stories and I mean we hear success story after success story and it's exciting to see that and it's exciting to see the role of the industrial engineer in the industry. Now Gary asked me to spend some time and talk with you about some 5 or 6 key examples of how the industrial engineers are being used in the

unique way and to point out that industrial engineers and the function of industrial engineering being used to help corporations change and become more competitive. Now there are slot of examples I can come up with thousands but I picked a few that I think that are certainly exemplary of what's happening the industry. One is Anheuser Busch and I am sure that those of you had a right arm tilt of a couple of beers known their products Budweiser, Michelob, to name only a few. Industrial Engineers have developed what is called a reach for excellence program which is a corporate performance excellence program throughout the organization. The company slogan someone still cares about quality applies internally but it also applies to all the distributors. About 5 years ago Industrial Engineers launched a program to determine customers perceive values of the taste of that product and to determine why that perceive taste or the value of that perceive tasted changes. Thanks to the Industrial Engineers they caused kind of a land slide wholesale change in the way they store and distribute their product. The result of that is that perceived value of the taste and really that is the bottom line for a beer to appear has gone up dramatically in the last 7 years and the quality of the product as perceived by the customer has changed and it has allowed them to increase their market share over their major competitors. Now the Industrial Engineers were tied square into the center of that operation. Industrial Engineers there were also invovled in the senior executive white collar productivity program. Now if you ever think that there is a way that you can certainly cut a career path short is going to a senior vice president, executive vice president and telling him he is doing an ineffective job.

They obviously used slot of young IE's because they figured. if they lost their job they would be able to recount profession pretty quickly. But I happened to me a couple of them over a beer as a matter of fact in St. Louis a couple of years back and it was exciting to hear the kind of approaches they took and the fact that someone three years out of school understood the issue of sensitivity that was involved in doing what they call productivity. Not just what it took to do white collar productivity. What are the issues effecting peoples own perception of their own worth and own efficiency. Industrial Engineers live that charge and it is exciting to see that and it is happening more and more in the Industry. Glaxo is another example. Glaxo is a pharmecutical company headquarters in United Kingdom. They opened up a manufacturer and distributor in North Carolina in 1984. First time they ever became Into the United States. First year they had a million dollars in sales, five years later they have a billion dollars in sales. Interestingly enough in the U.K. Industrial Engineers were only used for one thing work measurement. That is all IEs are good for over there any more. Over here IEs launched a special computer they designed and developed computer integrated manufacturing system working with process control technology. Launched it, improved their bottom line, their net performance by 26 percent in the first year it was implemented. Second thing they did was to develop a corporate line productivity improvement program. They launched it in the U.S. It was basically an interdisciplinary approach to solving productivity problems within the organization. It was so successful that the

U.K. is now considering into putting their programs worldwide. Industrial Engineers productivity improvement, computer integrated manufacturing, white collar productivity again, and interdisciplinary teams. Phillips Corporation for those of you that are familiar with Phillips Electronics Corporation of the Netherlands. Phillips Corporation uses, they have a group called the Operation Organization Efficiency, 2400 Industrial Engineers worldwide in all their Divisions. They use them from everything, from Ergonomics Design to more rapid change over, tooling, implementing just in time production, computer integrated manufacturing. One of the things that I found to be one of the most interesting and effective was the design what they call the Mother Factory. Essentially each one of the Divisions in Phillips has one plant that is the inovator of new products in the process to produce them. I visited one in Belgium in their commercial lighting division. That division would research, design, develop, and produce the first product of any one line and before turning that boost to the other facilities when its surpass they would tie into and launch all the processes that were necessary to produce it effectively. Once step was fine tuned they would launch it throughout the organization. The result was drammatic reduction. Waste vastly improved performance and net bottom line and a quality that was unsurpassed in any of their competitors. The whole concept of the Mother Factory was created through the Industrial Engineering group. The 3M Corporation which you are familiar with, in fact I believe a recent issue of Fortune magazine has focused on the current CEO or 3M Corporation. The 3M has another measure of

changing a mans viscal customer. It has a goal that they have arrived at 25 percent of the revenues,of products that did not exist 5 years ago. They essentially encouraged innovation and failure. Because they have some 400 path applications a year and they have a failure on products and they pride themselves on failure product innovation that only one fact that their ideas are produced each year and what that does is you will find that throughout the 3H organization the stimulated approach towards new product development. Now our Industrial Engineers were used to help set up their quality system. Everybody thinks of quality and they think of some other person that comes out of the light in the sky and comes down and fixes all your quality problems. The Director for quality for 3M Corporation Doug Anderson is a 2 degree IE and is on our council on Industrial Engineering. Their whole program quality improvement is based on fundamental industrial engineering techniques. The quality consultant firm that 3M wants is quality system is made up of Industrial Engineers and their competitors are now becoming customers of 3Ms quality consulting group. The fundamental issue here is not that quality is wrong, it is quite right. The issue is that it's industrial engineers have been involved in development of a massive quality improvement program for 3H and has made them a successful leader in our field. The last organization I want to bring up is American Express and when people think of American Express they think of money and credit cards and they don't think of IEs yet Industrial Engineers are used extensively throughout the American Express organization. Those of you that realize when you lose a credit card 2 years ago at American Express It

went from 10 days to 24 hours to get your card, today they say they will give you a card on the spot. The team that analyzed and launched the program to go from 10 days to 24 hours was the Industrial Engineering team they call them performance engineers. They launched their gold card program. They were the team that decided to manage the product from start to finish on implementing the gold card program. Interesting program that the IEs did was called the 3 Sigma approach performance management and that was starting in their collections department which is not an easy department to work in. They took the readers that were their collection managers and collections people and they studied them and tried to find out what it was they did that was so good that caused them to have something like a 98 percent success rate with collections and then they audited it and began teaching everybody else how to be better collections people. The program, the design analyzed and implemented them is managed by industrial engineers of what they call their performance engineers. So and I don't have to tell you the successes that industrial engineers have had in the Navy. I visited 5 NAVSEA yards, I visited some 6 commercial shipyards as early as 1981 and as late as 1987 and I have seen more change in industrial engineers have been used in Navy shipyards and in commercial shipyards and I think this is a sign of recognition throughout the world that industrial engineering is a link to competitiveness. Now whether the competitiveness, whether the customer of the people of the U.S. in term of the DOD, were the customers particular card carrier of American Express, the bottom line is still the same, perceive value and it's not a cheap product. It's cost, it's quality,

it's reliability, it's flexibility, it's responsiveness. It's a very complex issue and industrial engineers can plug that leak and are plugging that hole in demand that is in industry. Now our role, the Institute of Industrial Engineers, in trying to work with industrial engineers a pretty exciting one, an exciting one for me because I am heaped in the middle of it and I am here only because this is the first step in a four day tour for me and I have three chapter meetings to go to, two luncheons and two breakfasts in the coming three days and it's exciting. I get to travel all over the U.S. and turn over the world and hear about how industrial engineers are making their corporations, their organizations more competitive. But at the same time I am hearing about the frustrations that industrial engineers are facing and the limitations that they place among themselves and that the organization has placed on them. It's not an easy job for the Institute of Industrial Engineers nor is it for a collective group like yourselves that get together and talk about industrial engineers and talk about the needs of industrial engineers and how we can use IE in our jobs to improve performance. There are slot of barriers there. With the Institute we see that there is two different products we have with the Institute. One of them you can pin point very easily, you can say well your business and you have to deliver something and what you have to deliver is service and that's the bottom line. When I joined the Institute I expect to get my membership, certificate and from there on I expect to get a good quality magazine and when I go to a conference I expect to hear a good conference and when I buy a book it better be damn good and

that's us delivering our product. There is a second product real intangible product and it is much more complex and that is essentially an expanded field of practice, that submission we have as an organization. We have to help groups like you to expand your practice and expand your sphere of influence in your organizations. And that's is hard. John White, those of you that are familiar with that name, perhaps for two reasons, one he was our 1983-84 president, he is currently the Assistant Director for Engineering for the National Science Foundation. He had to hit it on the head back in 1983 when he wrote an article on the future of industrial engineering and he pointed paragraph here that said the fate of the industrial engineer depends on the performance of the individual, it depends on the practice of the profession, and the practice is the profession depends to the greater extent on the individual ability to maintain competency through professional development. And that is was the Institute is all about. Trying to help Industrial Engineers maintain their competency and expand that influence. So the products and services we deliver are great and we believe in them and we are constantly trying to improve them. In fact we follow many of the same things. We are trying to product realization process, role in the employee in all aspects of the organization and understanding the changing needs of the customer, but than expanding your sphere of influence and expanding your profession is the tuff one and we need to work together on that. In the last two years the Institute launched a pretty comprehensive strategic planning process and we have tried to reassess the future of the profession and reassess the members of the Institute and try to better aline ourselves for making it

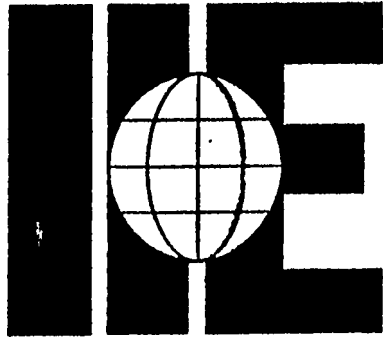
happen. It has not been an easy process and I don't want to go into the extent of the process nor the depth of the strategic plan that suffices to say was a real revealing process because when you do this you have to take a hard look at the profession. Sometimes there are things about the profession that the evangelist like me don't like to see and I consider myself a evangulist, now that I am not on TV I hope never to be on TV considering just what has happened. We are the evangulist and we go out and preach how great the profession is and it is hard to hear someone sit down and suddenly. A lot of people don't think they are capable of those things. A lot of people don't think they can do those things. A lot of organizations are sure you can't do those things. One day we get someone calling up and say my God the IE department is being eliminated at this organization. Well it's that bad. He are the industrial engineers now so what we are everywhere except dead. A lot of issues are at stake and this strategic planning process has really cause us to be introspective about it. Highlight some of these strategic initiatives that the Institute have taken to really apply what is changing in the profession. First in the area of industrial engineering research and education. In the next couple of years the Institute is going to launch a major effort to try to link up industry and academic researchers and secondly to develop a better agenda about what the needs of industrial engineers research on. One of the major ways we influence the stand and field of practice is certainly by finding new avenues, missing opportunities for research and expanding the sphere of influence in industrial engineering and quickly

translating them into formal education as well as continuing education. And that is a major need that is out there. Secondly is in the area of professional development. I brought some literature here, the Institute is launching the certification program. Now let me explain the certification. It is not through a place of formal education. Certification is not a good place for professional registration. Those are the two key elements that we have to continue in order to maintain the quality in the profession and the discipline in industrial engineering. The Bureau of Labor Statistics estimates that there are 350,000 individual in the U.S. today practicing industrial engineering. Now I would like to have half of those as members in the Institute because we only have 40,000. Now where are they, with all their power professions that people with an engineering degree that may have worked in engineering and design and stepped into the management and now we are responsible for industrial engineering function. Or maybe it is an individual who is now responsible for doing performance improvement programs in the service sector company or maybe it is an individual who is a mechanical engineer who has put in the manufacturing in the engineering department and part of it is the implementation and integration of all resources. 350,000 people. The industry is saying we need help in defining some minimum base of competency in certain areas. So we know when a person has entry level skills to perform these type of functions and it is not only industrial engineering it is many different disciplines. So the Institute is launching a five year program to implement certain certification and that is Competency Base Testing. It

won't replace the degree granted professional. It won't replace the professional registration, will continue to encourage that. The certification will be a major effort that will produce to help upgrade those industrial engineering professionals that are cast in the role without formal education. Service global development; I have traveled twice in the last two years overseas. Our President traveled to six countries in the last year. Our President this year will travel to two more. We find more and more that this so called image of an industrial engineering changes from one country to the next. I can assure you if you decided to put someone from the UK here from France there from Hong Kong there and from Indonesia here and said okay. Write down what you think an industrial engineer can do. In your wildest dreams and imaginations it would be so far field and surprise you and yet it would be confined at a much greater level than what we consider an industrial engineering is in the U.S. today. The U.S. has not brought us a sense of Industrial engineering, and don't let anybody kid you. We think industrial engineers and no industrial engineers can do more in any other country in the world. Our IEs do more than any other country in the world. So we are expanding our efforts to develop better alliance partners worldwide and distribute our materials and hopefully help raise the visibility of the profession which comes to the fourth major initiative which is marketing and. that is essentially raising awareness of the IEs role and productivity and quality improvement worldwide. The last is our dedication to continuous improvement to the organization but also the profession as well. These are the elements in which we feel we

have to undertake to make sure that the profession thrives. That charge, that commitment can't stop with us. That commitment has to be taken on by everyone involved with industrial engineering. Those of you that have been involved with industrial engineering in the Navy for the last 10 - 15 years understand that struggle. I know you do. I watched you go through it. I have been involved with organizations that like Lapso that had to face the fact that their parent company felt IE should never leave stopwatch work. That the only thing they should be doing is work measurement and in watching them take a risk and implement programs to definitely improve the performance and take a risk that their parent company would buy into it and watch in their parent company buy into it. What it took was commitment, a long term commitment and I think that is what we are all about, all of us in this room. Individual volunteers, individuals that are willing to take on the responsibility, not only doing their job but given that little bit extra to make the profession grow and expand into a field of practice we can all be proud of and never excepting that's that a field of practice has reached its limit. Because as soon as you do that, give me a call I will find somebody that is a little bit past that. I promise you that. So if there is anything I can leave you with is a congratulations because both groups that are in this room, SP-8 group, the NAVSEA group have really done a great deal for the profession and expanding the field of practice in the last 15 years. I will tell you that honestly. I was as proud at the honors and awards banquet as the NAVSEA folks were there to see Admirmal Horn and Captain McGinley get those awards because I

have been involved. I know what you are going through. I remember my first trip to the shipyard with was NASSCO which was 1981 and I have never been to a shipyard and I have this dream of what was big and what wasn't and I remember Jim Rucker took me in and we were talking the first day, I said what advice you can give me, he says keep your mouth closed and wear different shoes tomorrow, and he was right because I walked around 8 hours with my mouth opened and wondering how anybody it was a tremendous opportunity for productivity improvement, where do you start and my feet hurt like hell the following day. I walked about 20 miles that day. So I am proud to have been associated with the Navy and with the SP-8 program. It is exciting to see it and you have done something that I wish I could see in every industry and that is expand the field of practice. Don't lose sight of that. Don't ever forget it because it is the essence of success in growth through this organization and its profession. Thank you.



**INDUSTRIAL
ENGINEERING:
THE EDGE TO
GLOBAL
COMPETITIVENESS**

COMPETITIVE ADVANTAGE MEANS . . .

PRODUCT VALUE BETTER THAN COMPETITORS

RESPONDING TO CHANGING CUSTOMER NEEDS

COMPETITIVE EDGE MEANS A FOCUS ON . . .

INTEGRATION OF ALL RESOURCES

ROLE OF ALL EMPLOYEES IN THE PROCESS

EVER - CHANGING PERCEIVED VALUE
OF THE PRODUCT

NAE REPORT IDENTIFIES KEY INITIATIVES

PRODUCT REALIZATION PROCESS

EMPLOYEE INVOLVEMENT

CONTINUOUS IMPROVEMENT

INDUSTRIAL ENGINEERING - THE COMPETITIVE EDGE

Industrial Engineering is concerned with the **design, improvement, and installation of integrated systems of people, material, information, equipment and energy.**

It draws upon specialized knowledge and skills in the mathematical, physical and social sciences together with the principles and methods of engineering analysis and design to specify, predict and evaluate the results to be obtained from such systems.



LEADERS IN GLOBAL COMPETITION . . .

ANHEUSER-BUSCH REACHES FOR EXCELLENCE

GLAXO FOCUSES ON STRATEGY

PHILIPS LEADS IN DEVELOPMENT

3M FOSTERS INNOVATION

AMERICAN EXPRESS STRESSES SERVICE QUALITY

DEVELOPING INDUSTRIAL ENGINEERING

SUPPORT OF FORMAL EDUCATION

SUPPORT OF RESEARCH

ENHANCING THE CAPABILITIES OF INSTITUTE MEMBERS

MEMBERSHIP GROWTH AND RETENTION

PUBLICATIONS

CONFERENCES & SEMINARS

OTHER CONTINUING EDUCATION ACTIVITIES

ASSESSMENT OF MEMBER NEEDS

CREDENTIALING

HONORS AND AWARDS

REPRESENTING THE INDUSTRIAL ENGINEERING PROFESSION

PUBLIC AWARENESS

STANDARDS DEVELOPMENT

PARTICIPATION IN PUBLIC POLICY DEVELOPMENT

RELATIONS WITH OTHER ORGANIZATIONS



**Institute of
Industrial
Engineers**

**1990-93
Strategic
Plan**

STRATEGIC INITIATIVES

A Look to the Future ...

INDUSTRIAL ENGINEERING RESEARCH

PROFESSIONAL DEVELOPMENT

GLOBAL DEVELOPMENT

MARKETING

CONTINUOUS IMPROVEMENT

BATTLE FORCE MODIFICATIONS AND IMPACT ON INDUSTRIAL
INFRASTRUCTURE

By : LCDR Michael Bosworth, USN

I would like to speak about a Battle Force modification and a very small impact on the industrial infrastructure. Certainly a large topic and I am going to try to give justice to it. One of the task that I have been engaged in at the Naval Research Center, Carderock. First of all, I am a ship design naval architecture and I have been working in a disciplinary team almost like Mr. Balestero talked about. We have been working with a strategic planning process at David Taylor. One of the parts of the full process we have been going through is to start at the very beginning, and from the very beginning we would analyze threat and envision from the very beginning of the force conceptualization what might meet that threat in our future. We have approached this through time phase quantitative goals to support of the battle forces and show the times that are out there for current transition and the future for 2030. The 2030 was chosen so we could envision an entirely new battle. Our line to approach this large topic is that I am going to talk about the planning time frame we consider and producibility of frame work that we would use. Now I want to flash through a number of battle force concepts. These are not the battle forces that are found in a great scheme of things, they are simply concepts for a possible future battle forces. Now I am going to go into an alternative battle force architecture called D3+S1, and I will explain that. Now I want to talk about Carrier Dock Multimission

which is a ship concept which we have attempted to define. Really, trying to define it to a stage of detail that can be analyzed and assessed. I will talk about the impact on the industrial infrastructure and attempt to solve that. Planning time frame. The current Navy 1989 - 1990, getting close. Ships that are in fleet, ships that are under construction as our current battle force architecture and architecture that-s somewhere bald over a number of years. Way out in the right hand side over by the future Navy, we picked the year 2030 because that-s the time when you can envision a Navy unencumbered by our current Navy. In other words, the current ships have been retired. The ships that we are building now are very close to retirement and we can for the first time envision a Navy that is totaling different if we so chose. Of course very important is the transition Navy because you don't simply turn off Navy and turn on the other one the next morning. Every day we come into work we are entering that transition Navy and any future plans that needs to be considered how you are going to transition from one to the other. Why battle force modifications? The logistics and acquisition sometimes is the tailend Charlie. At least that is my perception and but logistics can influence the military effectiveness as much as anything that needs to have a very high visibility from the very earlier stages of design. The current decade really promises to be tighter and process that I think as crisis of an affordability and effectiveness. Effectiveness in the threat is getting harder and harder to deal with and certainly the past decade has seen large Navy budgets but we don't see those budgets keep increasing or even stay the same in the future. In fact they will decline. So this is a process of

both effectiveness and affordability. I am going to go quickly into this producibility framework which is work that I did years ago at MIT. But basically I am saying that producibility could be considered as wartime and peacetime for this. This is a methodology that I worked up in order to get a thesis in MIT. I took this peacetime producibility and investigated that and broke it into five different areas. One was fleet concept and preliminary design and I will talk about that in a little bit. Now I am going on to my various fleet concepts in the architecture as I have mentioned in this specific ship design. The two major qualifications producibility that I envisioned in that is wartime producibility which focuses on the least amount of time. In otherwards, the cost is of a low import and I think you are going to fight the battle real soon. Peacetime producibility is the least cost to get the most effectiveness. I am going to look at that peacetime producibility. I brought these five categories of peacetime producibility. I am going to focus on the first two. Fleet concept which is something where before you even think of designing a ship, you think of what's the overall concept of the fleet and how you are going to distribute the functions in that. Preliminary ship layout which is the earliest stage of the ship design. The thought being that you can have tremendous leverage on producibility issues looking at having influence on these various levels of design. I am going to flip through these battle force concepts and during one of this topics I think that we prefer that something I think maybe born to use I can work in which I think sometimes gets into

the more of the later details. This is certainly a producibility issue that can be of great importance. You have a conventional force. A conventional force is what we have now but it does not mean that you have conventional ships, they can be very unconventional ships. One of those ships is the turtle ship which is basically an extension of current service combatants designed to deal with massive attacks and to go ahead and watch massive retaliation in terms of air to air missiles, services air missiles, etc. Standing towards highly cooperative even ship systems that has the capability. I have a nice pretty picture here. This turtle ship in fact comes from popular mechanics. The turtle ship working on cooperative engagement with Aegis cruisers. Another force you could consider is the modular force. This is something that really gets to the heart of it. And let me stress that these pictures are not the only pictures of this force. This just one sort of picture mind juice is flowing. This one is the integrated tug barge. Certainly a modular type force for this number of prototypes of a modular force to consider. Stress manufacturing efficiency has some increased standardization and replaceable modular of some sorts. Another type of force could be the mother ship force. It could have large tenders which could have smaller vessels that work out. To give you some additional possibilities, this is a picture of a strike force with hydrofoils, or it could be anything. The mission could be ASW, AEW, it could be a number of these pictures. We have a low observer force pictured here are a semisubmersible ship concept that's being worked on at David

Taylor renovation project that is going on right now. But certainly we have a low observer force as a submarine. A true submarine. And it could be an observer ship that is shaped for low signatures and radar for our section or machinery or low acoustic signatures. Distributed aircraft force. We certainly made some trends for this distributed aircraft force in the Navy having spent some time on the destroyers. Most destroyers now have a helicopter for ASW, a very vital part. So that's a type of distributed aircraft force and this is an extension of that trying to get other missions distributed. That's a Boeing picture I believe. A Steel Harbor Marine. There is another possible distributed aircraft force. Other possible forces, call a robo force if you will. Significant reductions in personnel and significant new increases in the payload densities. A very technology intensive. Here is an interesting one, OBI force. Intense advance weaponry, in otherwards, trying to make a change that is so dramatic that it really boggles the mind of your opponent whose in your technological race with you. Again this is technology intensive. Let's observe changes that happened when we went from sail to sea. It could be a weaponry change. Another possibility when we are thinking of logistics and that's the frame that is initially being used in this. It is an all nuclear power force. Certainly that has logistics possibilities that are tremendous and nuclear aircraft carrier has proven out some of that in terms of strategic movement. It's a conventional workforce with the having aluminate the need for every 3 days to

pull alongside for refuel. A significant restriction that I saw where I was an Assistant Engineer on a USS RANGER aircraft carrier. Another possibility is the low energy maintenance versus combat force, this is again is a little far out, but the idea of having some sort of solar power or wind power that pushes you around at peacetime and you don't really need to go fast in just as much as a train and more time you have for stability. Now I have flash a little bit on goals and if you have a threat and you need to make some goals and for logistics we made these goals in a strategic planning process that's ongoing now at David Taylor. The goals, I am not going to go into the details of them, I don't expect you to memorize this there will be no test, but they are planning towards fuel, ordnance, repair, and logistics support chain. They were very specific in terms of how much by when and that's an important time phase quantitative. Now we took a look at these forces and bounced them against the goals, a little bit more detail then showed here on this consumer reports format, but if it is dark that means it is good and if it is light that means it is not so good, or not much of an improvement. In some areas some show improvement, some areas others show improvement. There is a gap here and I want to talk a little about that last call. I want to talk about an alternative battle force architecture D3+S. This D3+S is one we are starting to investigate in more detail stands for Distribute, Disperse, Disguise and Sustain. It envisions only two types of ships. We chosen new names to show that there are to get away from the frame work of past. Helos and scout-fighters. They have lower signatures, higher endurance and it handles a number

of different forces. The one pictured here is not amphibious but it's meant for battle forces of the future, surface *acting* groups, etc. The signatures of all these CLO'S are as identical as you can make them and scout-fighters are identifiable and you try to make scout-fighter into CLO as somewhat as possible within the constraints of the fact that one is going to be somewhat hardened than the other one. That is certainly a big constraint in some signature areas and same or similar systems are used by a number of ships. Perhaps the same power plant. Same unit support. That certainly has some possibilities in industrial engineering visibility. Only in fact D3S took some ideas from each of these different force concepts, some more than others, and attempted to blending in the real possibility as good as possible and try to get more dark spots than the others. D3S architecture is aimed at removing the source of the problems and that-s the key to process that we are trying to put together at David Taylor. For starters, about two years ago it sounds like the same time frame. We saw these problems as being the observability of ships and the fact that you could discriminate one ship from another which certainly plays to the strengths of our principal parent, the Soviet Union which masses five power very well. The concentration of functions, for the fact that the loss of one ship in the task force, would possibly mean the total loss of a particular function if you have all your aircraft on a single ship and task force you lose that ship or may not lose it but just lose the function of the ship and your out to lunch as far striking capability is concern. Very long demanding

logistics tail something that is vulnerable and expensive and programmatically demanding so we try to reduce the invulnerability to distributing, dispersing, disguising and sustain. The proposed force level group change or battle group change would be like this on the left is how a current care of battle group or activities group would look with different signatures of outline, which ship is which, and on the right in the center of the circles there are the carriers of large objects surrounded by the scout-fighters and we have investigated the possibility and we are doing that now of what that scout-fighter should be. Whether it should be a rather small single mission ship, a very large multi-mission ship, or something in between. We have focused in on key regions for the proposed change architecture are two fold. One is for increase military effectiveness and one is reduced cost. But that reduced cost really plays into increased effectiveness because if the cost can be reduced than you can put more units up there which means that you are now more effective. We are trying to shrink the bad guys battle space to within our own battle space where our weapons will reach and we can negate that massive fire power. We want to increase the effectiveness of our own decoys. It is an important factor. To do this we made a number of goals and I am only going to put two of them up here. One of these goals is radar

signature. The picture shows how we would like change from our current situation to our future situation of bringing the battle space within our own battle space. Another goal area if you ever need one, would be range and endurance and I feel that the increase of range and endurance is something that could be crucial for the United States fleet of the future. I sort of pass through this hierarchy a little bit and force concepts which I had a bunch of them in very little detail and force architectures where we have some picture of two of them. The conventional one, the one that we will have if we don't start envisioning for our future. The D3S which is a strong and possible alternative. And there is Charlie Delta, Echo which hasn't been thought about by anybody yet but I encourage that you start thinking. The whole idea is to get some detail on these concepts that they can be assessed, compared and when we make our choice for a future battle force architecture based on a thought process rather than simply inertia. Now I am going to go into system ship concepts. The concept is that of a generic ship just configured in construction to carry the large objects for the Navy missions. Conceived as a monohull has a well deck, has a flight deck of sort and each varying the similar possible of the others and configured for a particular warfare inch and really oriented around the battle group, in otherwards the design was already for the battle group. We concentrated on the combatant

combatant ones and this is the status of the work that we have been doing over the past six months. The CDA amphibious and the CDL direct logistics support ships are the ones that we have done a first duration on and I will show you a slide on that. We are currently working on three that are single underlined, those are aviation type ships and mother ship type ships. There is slot of other possibilities you can conceive off but we think that those five are some of the crucial ones that the Navy wants to consider. There are certainly a number of interests, slot of interest in sealift and we are just starting to do some looking into that and we have started making some contact with MARAD. Carrier deck multi-mission (CDM) amphibious variants. This is what our first iteration came out to look like. Basically the flight deck is a stovall flight deck for the stovall aircraft. The aviation is a current stovall aircraft, V22 is one that you can certainly go out buy it if anyone wants to. And there is work in NASA, Langley, and other places on an advanced stovall aircraft that would be supersonic which might have the capability of F18 fighter attack aircraft put in the stovall mode. This is the type of craft we used. It turns out to be about 760 foot long, about 30 - 45 thousand tons. The logistics variants of this look identical. Exterior looks identical, interior arrangements are somewhat different but slot of components are very similar. So there would be a significant commonality of buying and there would be a significant commonality of some of design. In fact the engine rooms would be exactly designed the same. It is interesting that how we design these engine rooms

now is for each of these types of ships we will design them from scratch. That's a tremendous expense. This was an early artist conceptualization of what the ship might look like. But this is the type of ship that would have the possibility to disperse air throughout the fleet. There are some distinct possibilities. You also have these significant hanger bays so that a ship that does not have too many aircraft can hanger without the expense of elevators and also service platforms for the combat systems and Aegis type system. After we went through our first iteration this is what we think it might look like and I stress this is the first iteration of 246 iterations so I don't expect you to go out and buy one of these right now but the idea is that we can conceptualize it into enough detail where it can be assessed and compared to what our alternatives are which we put this fourth as an alternative. This is a Carrier Dock Amphibious, well deck, having Aegis type system and we use the AV8'S and V22'S are aircraft baseline and in fact one of the things that we found we had to do to work on this design is that we had to talk to all the other Navy labs. Something that we do to some extent but we got more and more into than I expected. This is over the past six months, seven different Navy labs. We are working very closely with NADC and NSWC. The smaller ship here is conceptualization of the middle line scout-fighters, the middle side line, you can see that the scout-fighter is maybe a little

hydrofoil or submarine or submersible that operates out of the well deck or it could be what we now position as a battle force combatant, something very large. We can see that some significant problems in cost, we have not been able to get enough of these battle force combatants around. We have envisioned what the task force would look like and I am not going to go into much detail on that. But sometimes these task forces start looking a little bit different, the logistics task force of today and it is hard to say what the logistics task force of today is. But You know it has to be protected by, some sort of combatants. The future one you would say the logistics ship might operate by itself and operate in a lower threat area but be able to defend itself from whatever can make it through. So we have envisioned what sort of fleet you would need for this because you have to in order to plan your cost and transition and you need to know how many you have got. Impact of carrying out multi-mission on the battle infrac structure that some of the assessments we are trying to do now but to just talk about it. If the Navy will commit to large ships and larger production lines then certainly it gives stability in long range planning by shipbuilders would be encouraged. That is a big if. That is why it is underlined. The Navy has not been known for a really long range planning. Program cost reductions are putting Naval war money going into shipbuilding contracts vice programmatic and certainly all of us that worked in this area have seen some of the high money going into the programmatic. Fewer ships overall but more tonnage. Virtual monopoly of gas turbines is the gas turbine plant and if you are saying you want to have a large vessels in the Navy it is

going to be slot of gas turbine plans out there in the U.S. Navy with this envisionment. Revision of the naval acquisition and support infrastructure to deal with it any change is painful and is likely going to be initial confusion as an attempt to deal with this greater commonality. The greater varsalarity in containerization would encourage shipyards possibly to become more assemblers. It is a trend that we see now but assemble of the components are manufactured elsewhere to a greater extent. Now there is different levels of modernization and containerization and I am not going to go into this too much either but you can envision something where you can take a large palle sized thing and put it on a truck and truck it from Wichataw, Kansas, to the shipyard, ship assembly plant, and you weld it in, and it stays there forever or you can envision it to a point where you do the same thing except that you make it where you can unweld it and replace it during a regular overhaul or so that your ship can come into overhaul quickly to a swap out and get out more quickly, or you can envision that everything is in containers that you can be bolted down and unbolted and ship it in formations. There is slot of different levels of containerization and modularization. There are being dealt with or attempting to be dealt with. This is a vision, a vision that is getting a little bit more defined each day. Reality is where our business is and between the two you need a bridge with system engineering, years and years of dedicated systems engineering of a team of interdisciplinary experts. The summary is that considering that logistics and acquisitions from the very acception of battle force task force concept formulation is

extremely valuable. In each of those task force concepts contributed in some way, some more than others, to the first alternative in D3S. System engineers that have acquired a push level rate and the need for assessment costs and military effectiveness and you need two in your equation, and it is carried out multi-mission that I have given you is the start of this definition process.

Battle Force Modifications and Impact on Industrial Infrastructure

Problem: Design a battle force that considers logistics and acquisition as powerful, integral parts of the warfare equation from the very inception.

Approach through time-phased, quantitative goals oriented to support of the battle forces.

Current (1989)

Transition (2010)

Future (2030)

LCDR Michael Bosworth, USN
David Taylor Research Center

OUTLINE

Planning Timeframe

Producibility Framework

Battle Force Concepts

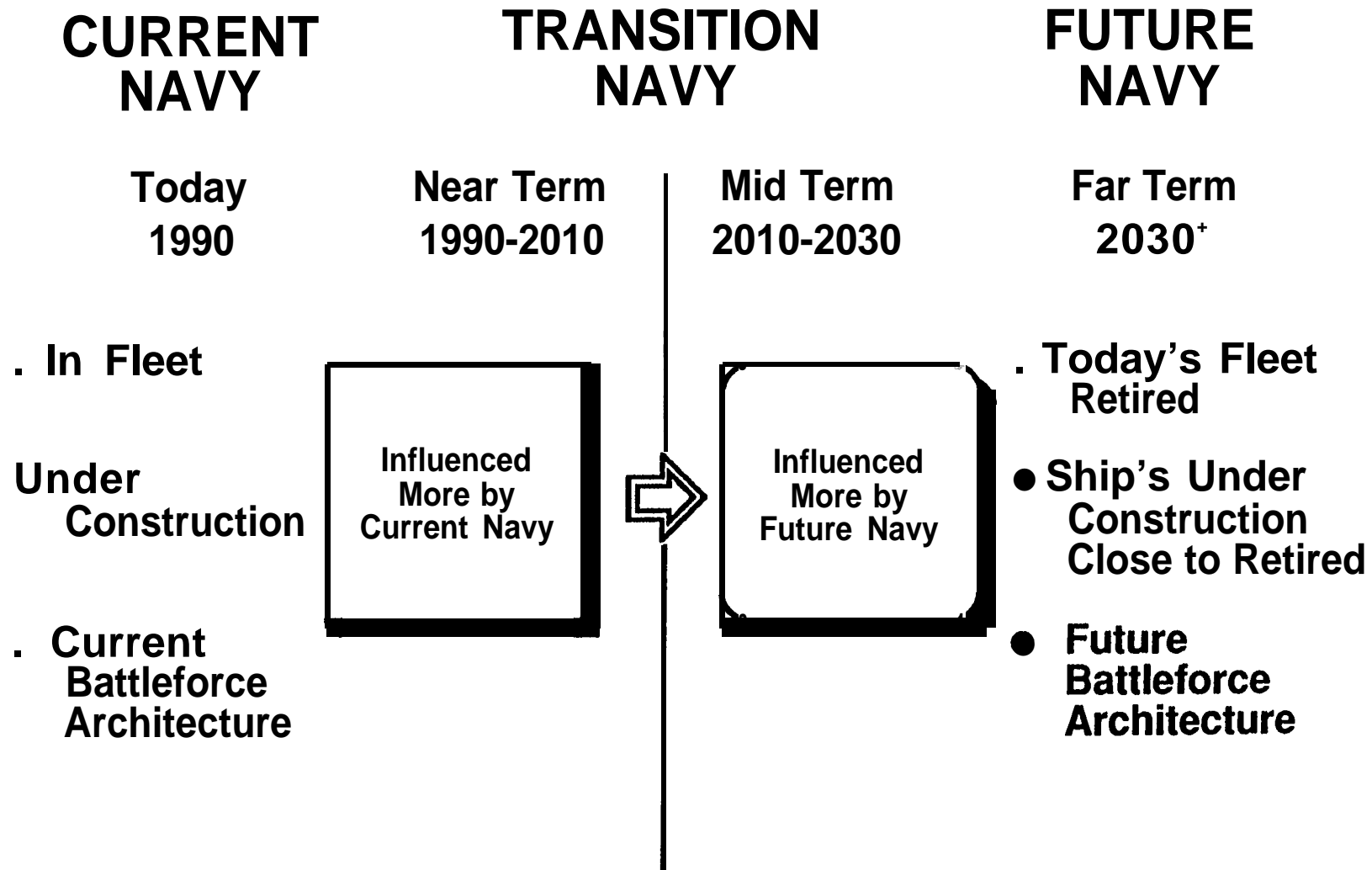
An Alternative BF Architecture: $D^3 + S$

**Carrier Dock Multimission: Ship concept
within $D^3 + S$**

Impact of CDM on Industrial Infrastructure

Summary

PLANNING TIMEFRAME




WHY BATTLE FORCE MODIFICATIONS?

Logistics and acquisition have been "tail end Charlie" for too long; Logistics influences military effectiveness and cost with the best of them and must be considered early on and with sufficient weight to influence the product that makes up the fleet. Acquisition is the primary driver on cost and thus has a dominate effect on numbers of ships available to fight.

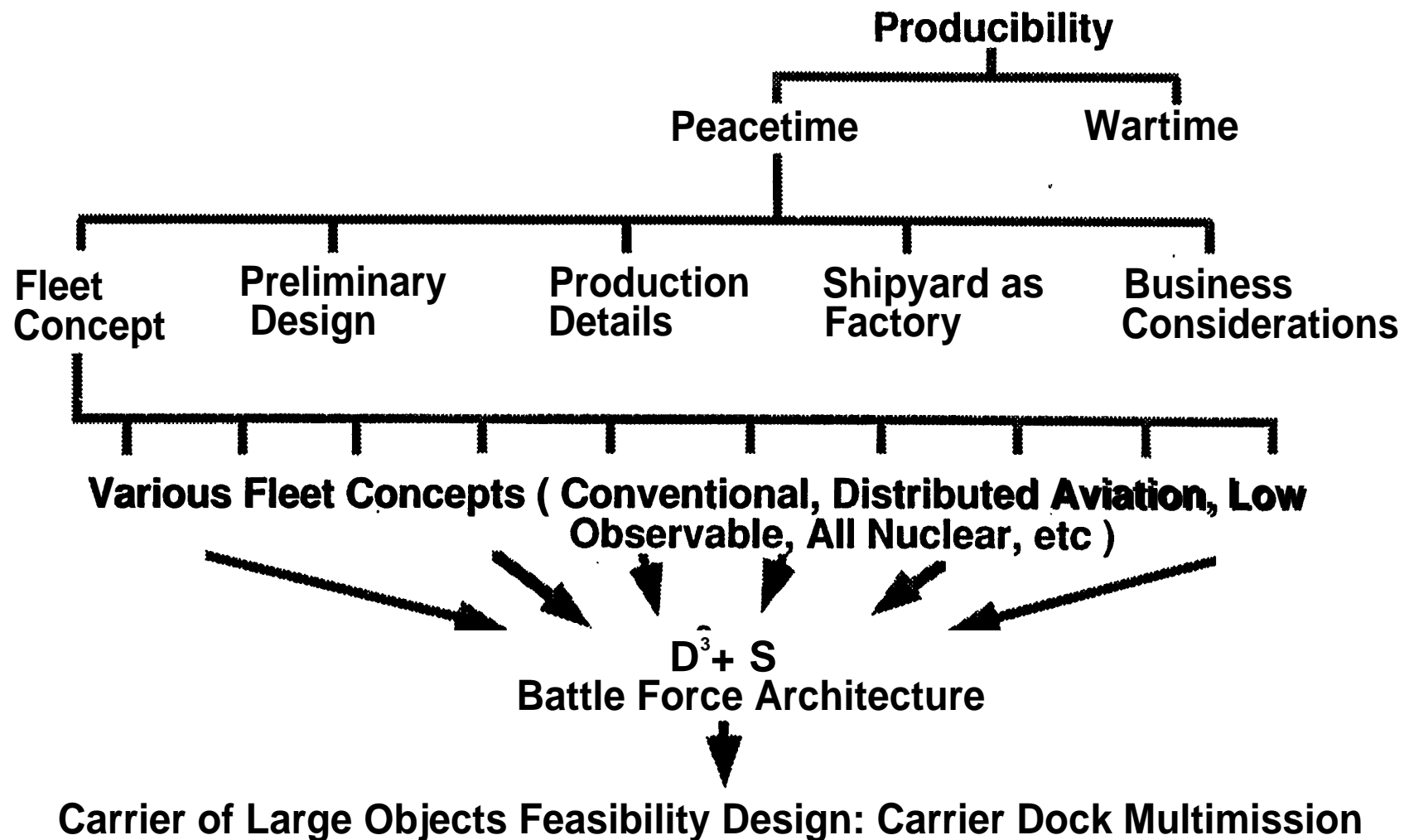
The coming decade promises a crisis of both effectiveness and affordability, due to an increasingly technical threat and a leveled off or declining military budget.

OUTLINE

- Planning Timeframe
-  Producibility Framework
- Battle Force Concepts
- An Alternative BF Architecture: $D^3 + S$
- Carrier Dock Multimission: Ship concept
within $D^3 + S$
- Impact of CDM on Industrial Infrastructure
- Summary

David Taylor Research Center

Producibility Framework



Two Major Classifications of Producibility

Wartime Producibility: In wartime, or in a prewar mobilization environment, the primary objective is to produce ships in the least *amount of time*.

Peacetime Producibility: In the peacetime environment, the objective is to produce the ships required to maintain an effective Navy at the *least cost*..

Categories of Peacetime Producibility

- **Fleet Concept:** pre-concept design determination of fleet mix, ship mission and requirements.
- **Preliminary Ship Layout:** conceptual through preliminary design sizing, subsystem selection and tradeoff studies.
- Production Details:** contract and detailed design elements that do not affect ship characteristics and subsystem selection.
- Shipyard as Factory:** function of the production facility physical and its interface with the design.
Decisions in this category might be made independent of a specific ship acquisition project.
- Business Considerations:** business /acquisition strategy and material supply. To be considered throughout the entire span of the ship's conceptualization, design and production cycle.

OUTLINE

Planning Timeframe

Producibility Framework

➤ Battle Force Concepts

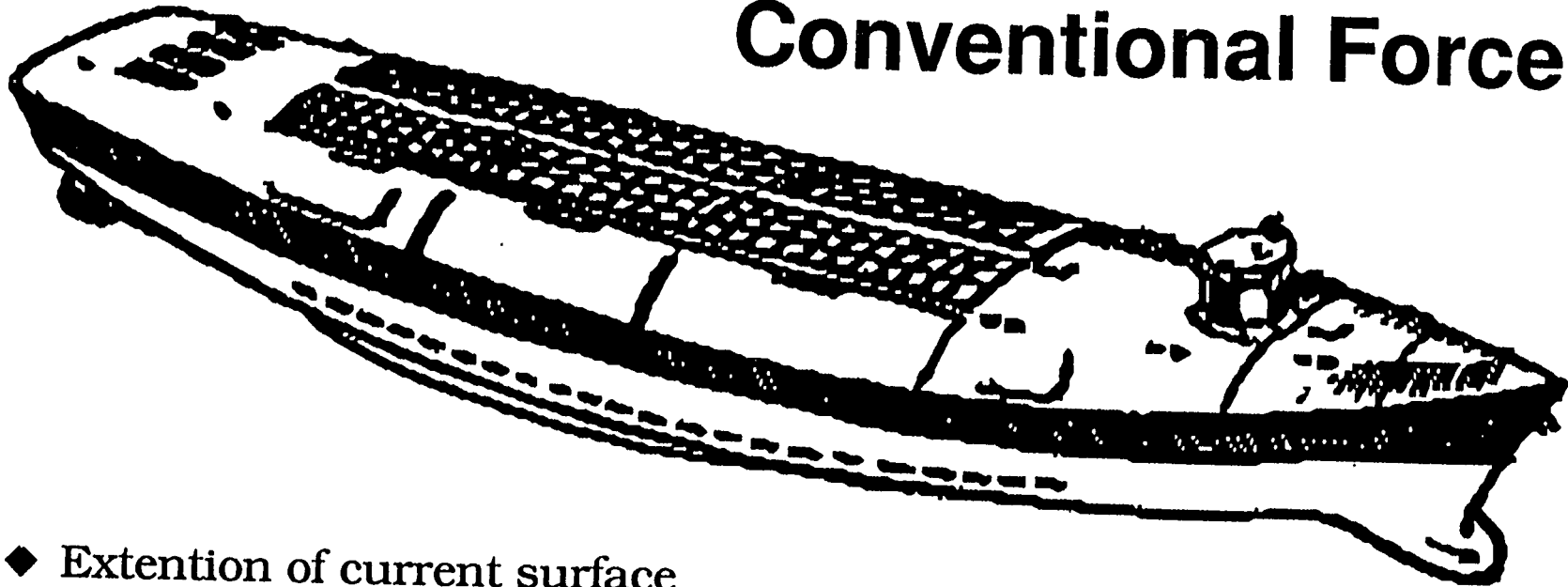
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Summary

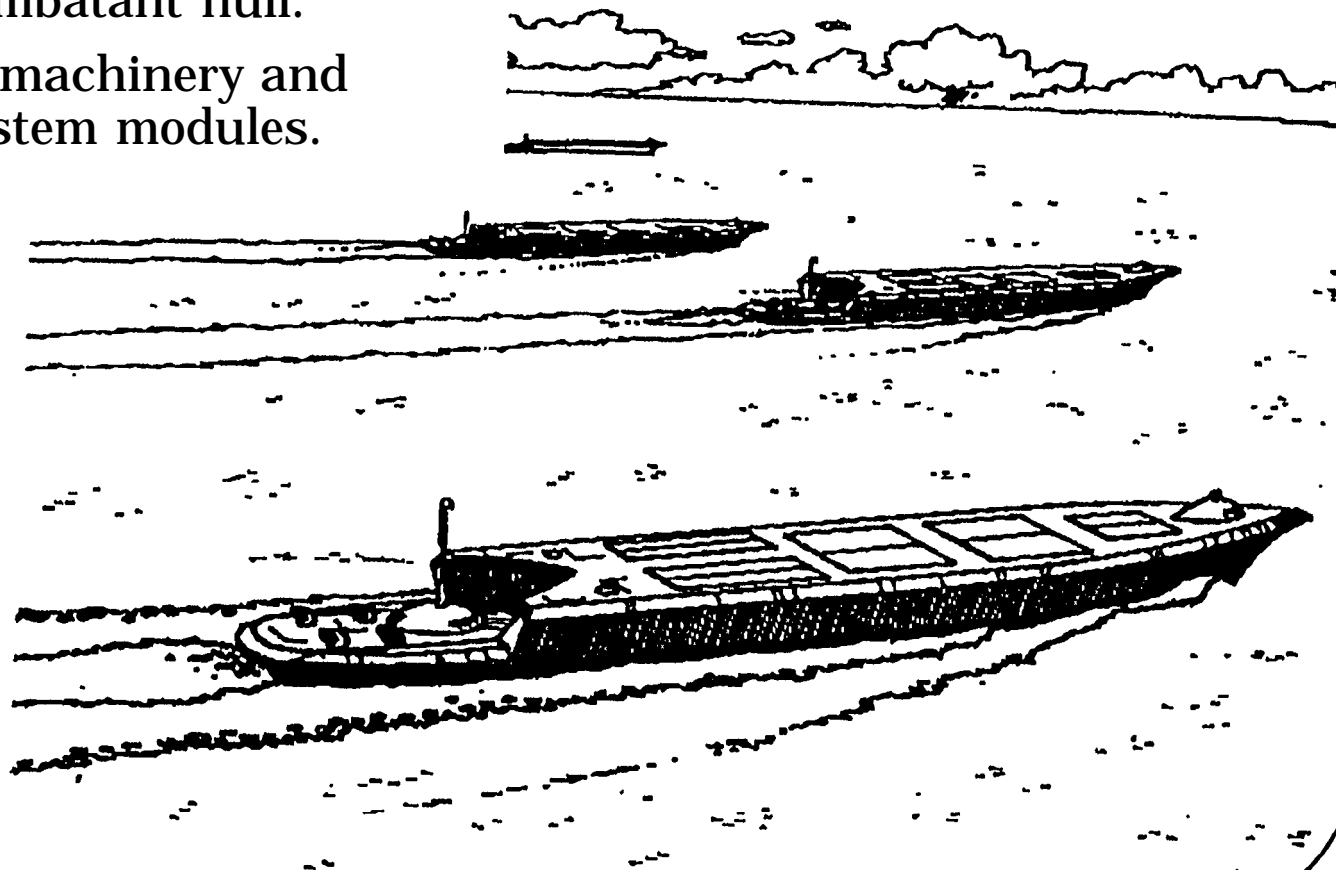
Conventional Force



- ◆ Extention of current surface combatant, designed to make massive strike attacks and fend off massive attacks.
- ◆ "Large" weapon capability.
- ◆ Multi-warfare complete fighting units.
- ◆ Centralized Force command.
- ◆ Highly cooperative intership systems to enhance capability.
- ◆ Would stress mobility and endurance to compensate for limited overseas bases.

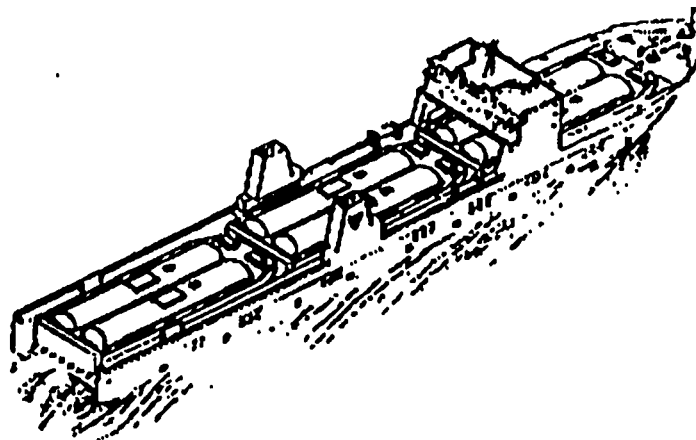
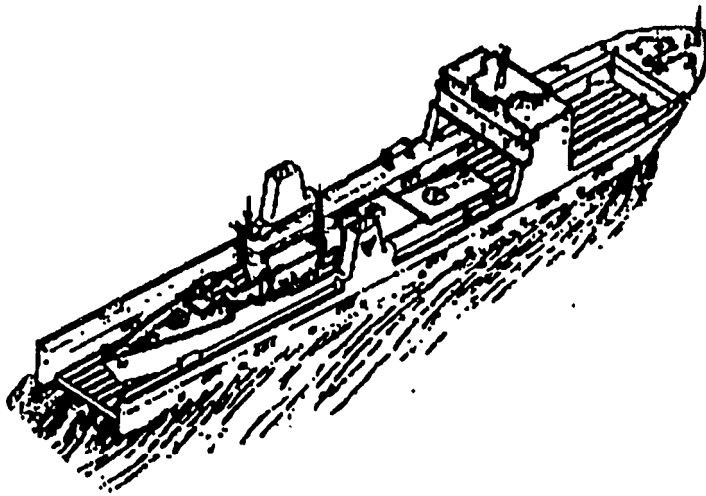
Modular Force

- ◆ Would stress manufacturing efficiency.
- ◆ Standard combatant hull.
- ◆ Replaceable machinery and combat system modules.



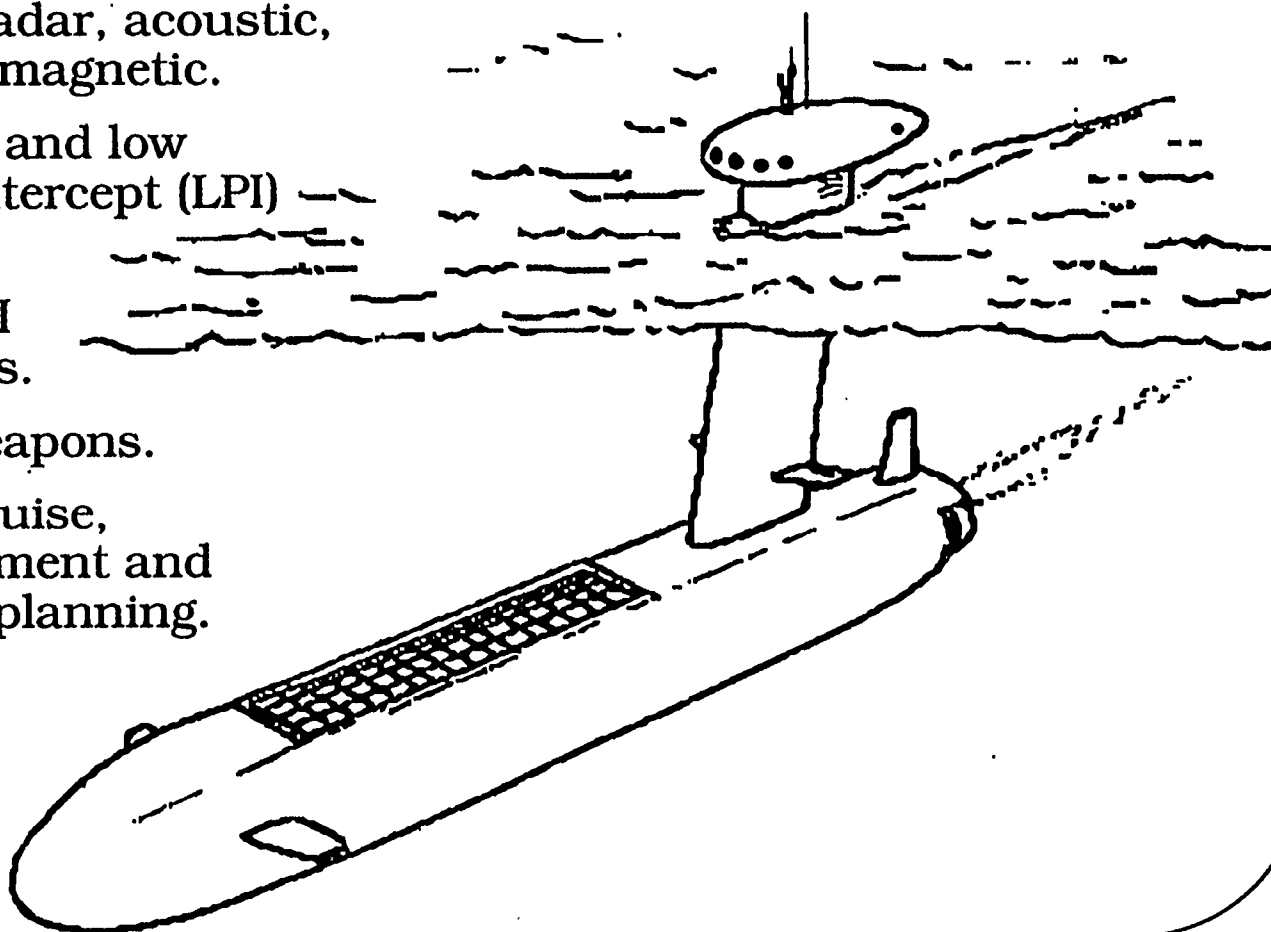
Mother Ship Force

- ◆ Force consists of large tender ships, each transporting 3-6 smaller combatants.
- ◆ This smaller surface combatant would be a high performance craft, smaller than typical today (4,000 tons or less) with emphasis on speed and offensive capability.



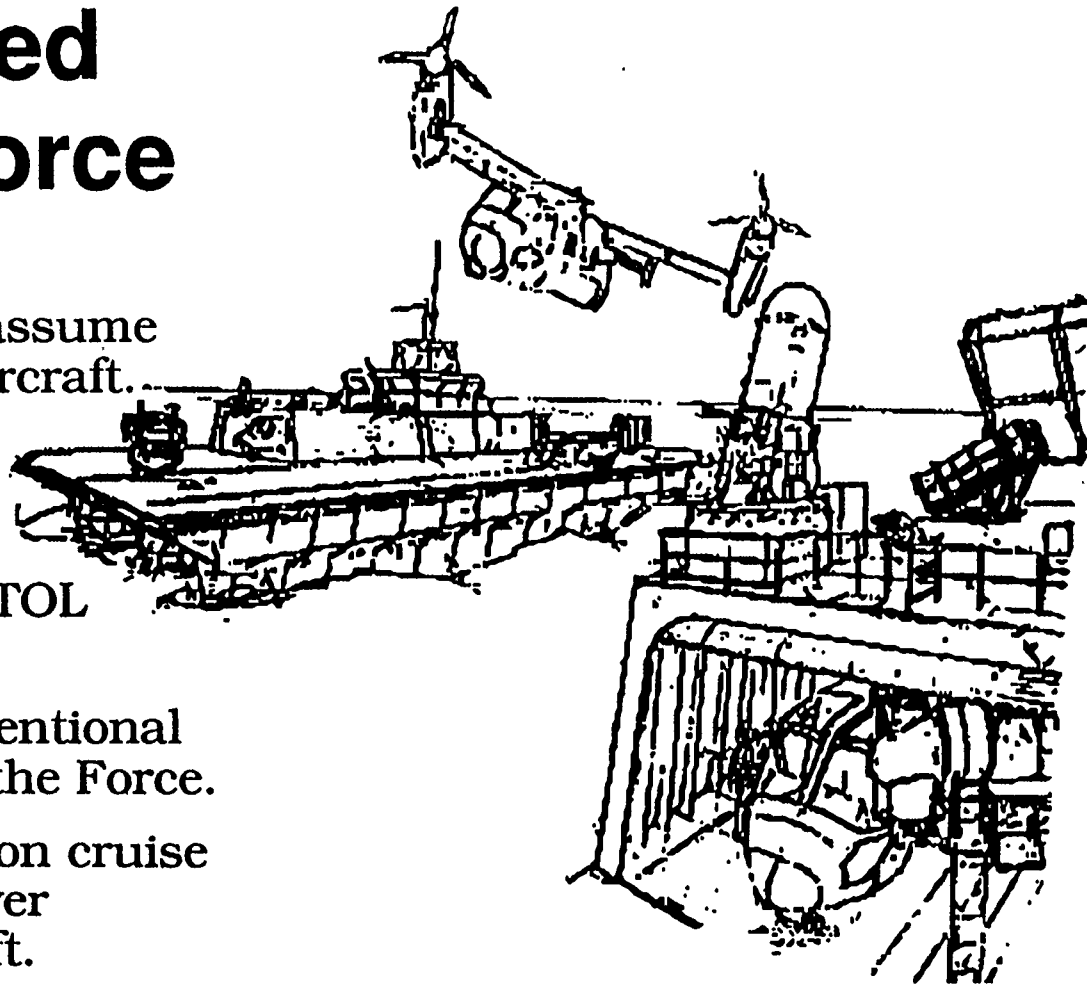
Low Observable Force

- ◆ Concentrates on reducing the enemy's battle space rather than increasing ours.
- ◆ Low signatures; radar, acoustic, infrared, wake, magnetic.
- ◆ Passive, external and low probability of intercept (LPI) sensors.
- ◆ Restricted and LPI communications.
- ◆ Fire and forget weapons.
- ◆ Emphasis on disguise, dispersed placement and predeployment planning.

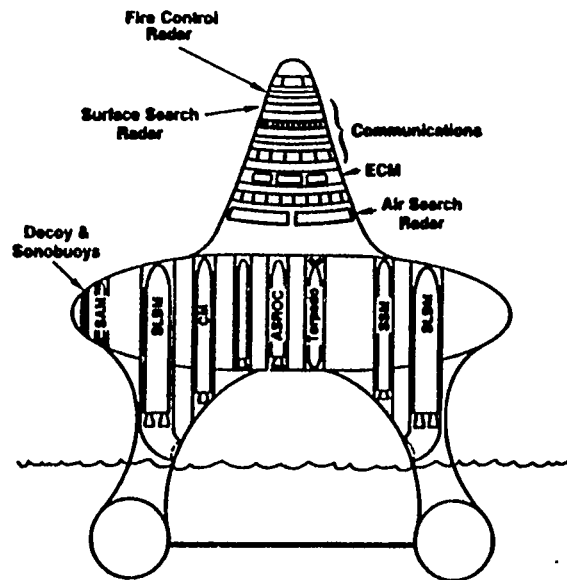


Distributed Aircraft Force

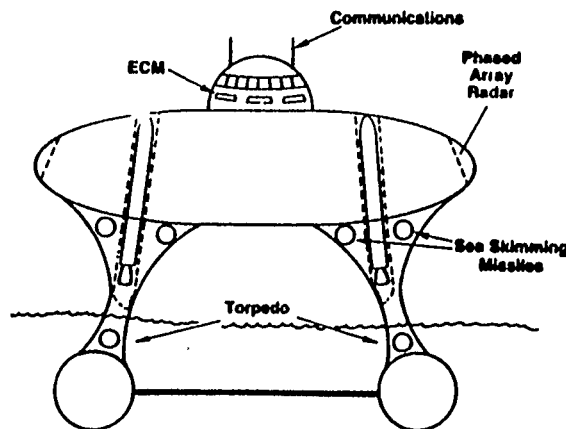
- ◆ Surface combatants assume role of hangering aircraft.
- ◆ Each ship host 3-6 VTOL aircraft.
- ◆ Results in fewer conventional aircraft carriers in the Force.
- ◆ More reliance placed on cruise missiles, due to lower performance aircraft.
- ◆ "Carriers of aircraft, not aircraft carriers".



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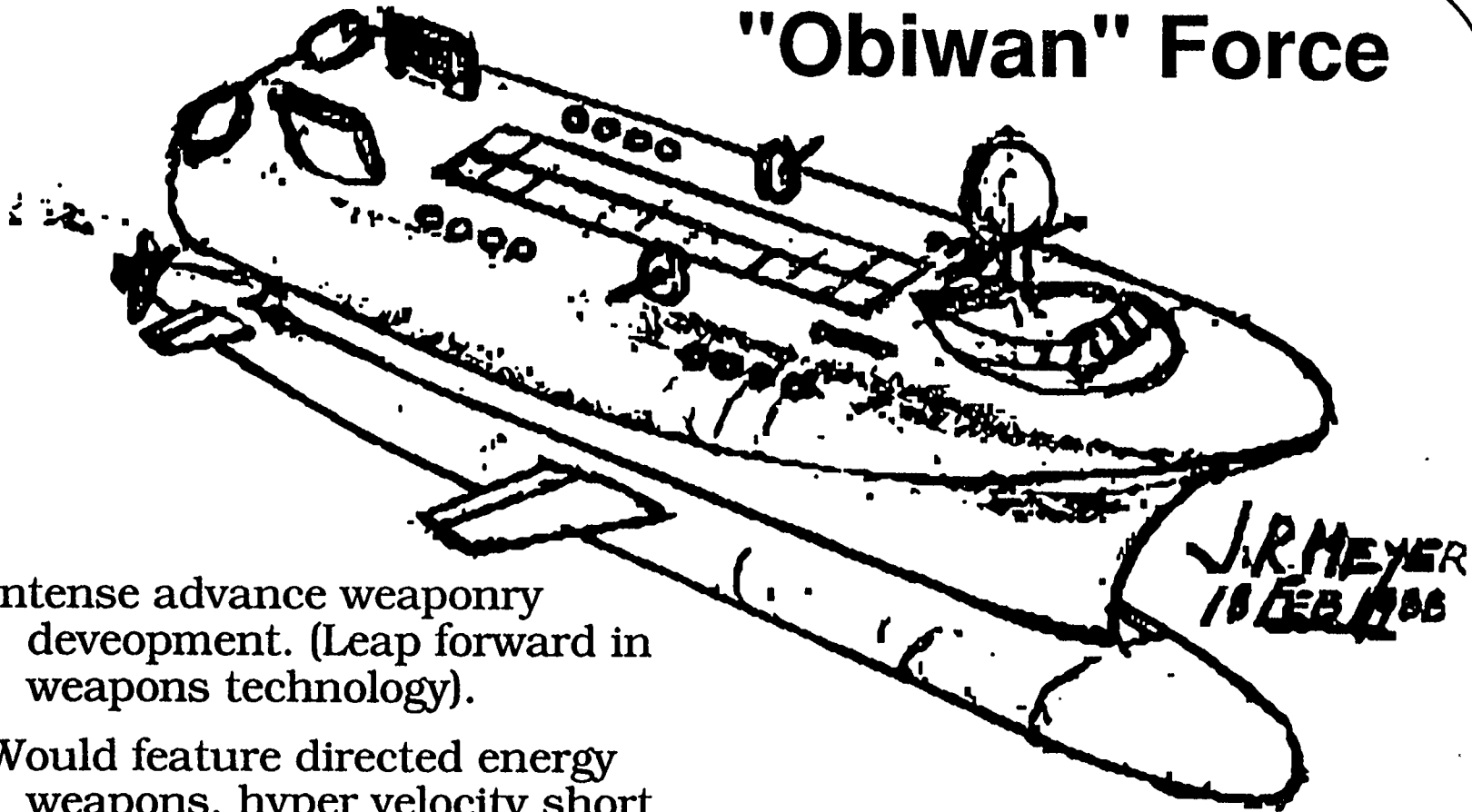


- ◆ Highly automated.
- ◆ Significant reductions in shipboard personnel.
- ◆ Significant increases in payload densities.
- ◆ Technology intensive, specializing in robotics, unmanned vehicles, information fusion, artificial intelligence and high reliability systems.



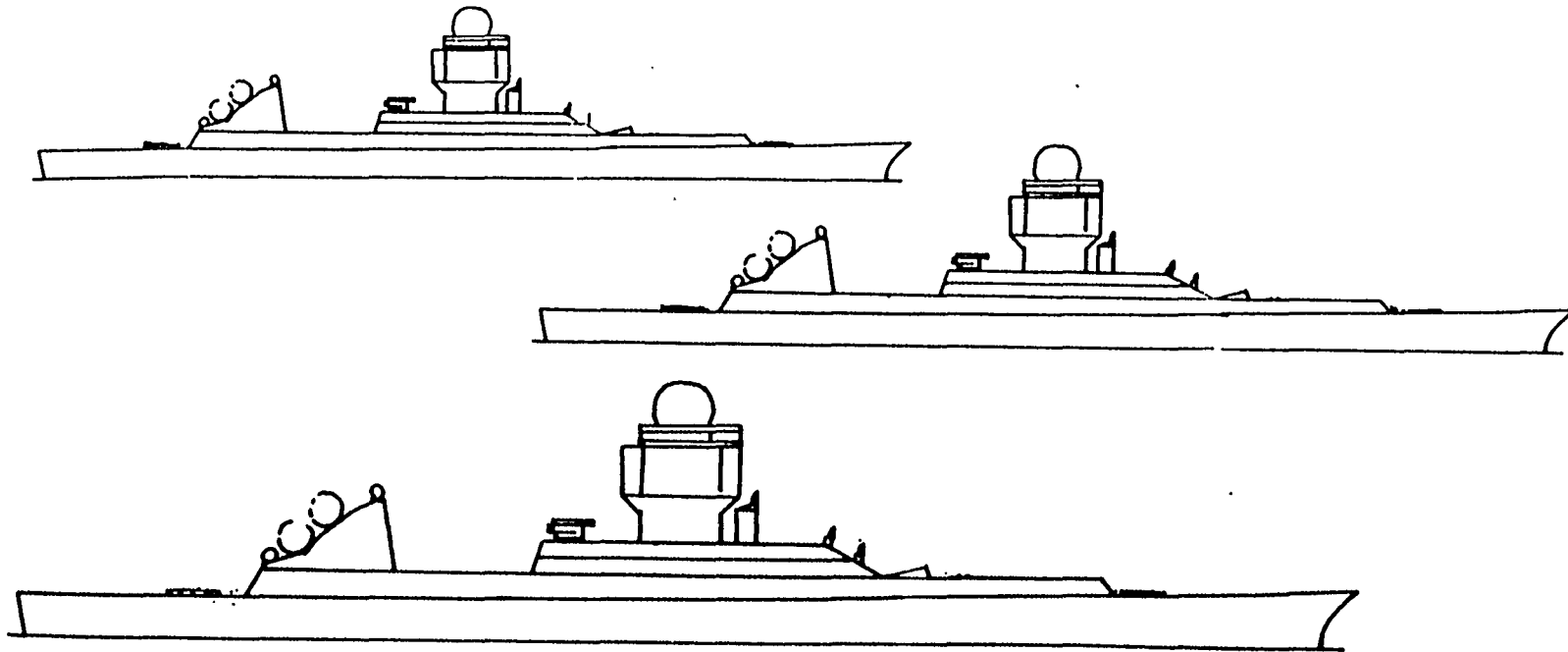
Robo Force

"Obiwan" Force



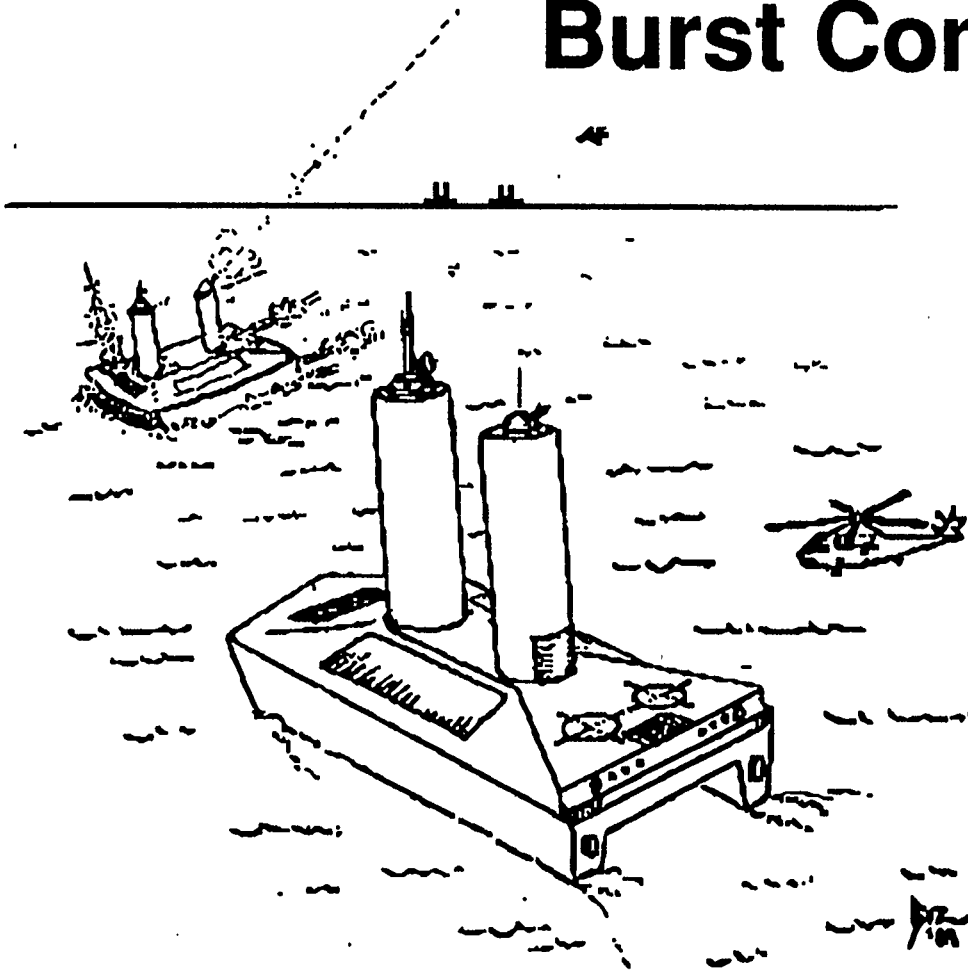
- ◆ Intense advance weaponry deveopment. (Leap forward in weapons technology).
- ◆ Would feature directed energy weapons, hyper velocity short range missiles and long range strike missiles.
- ◆ Heavy reliance on space assets, for surveillance and targeting, and as weapons.

All Nuclear Powered Force



- ◆ A conventional force, but powered (all ships) by nuclear generators.
- ◆ Similar to the nuclear submarine of today, size the ship to carry all supplies and munitions required for its mission.

Low Energy Maintenance, Burst Combat Force



A Force that in peacetime utilizes wind or solar power for its energy requirements. In wartime, a high power density power plant provides burst power for high speed propulsion and for weapons utilization.

Logistics Goals for Battle Force Modifications

Fuel Goals Priority One

- F1: Reduce frequency of UNREP
- F2: Reduce tactical limitations due to UNREP
- F3: Reduce fuel stocking requirements
- F4: Reduce manning for UNREP

Ordnance Goals *Priority Two*

- 01: Reduce frequency of ammo UNREP
- 02: Reduce tactical limitations due to ammo
- 03: Reduce ordnance inventories
- 04: Reduce manning for rearming

Repair Goals priority *Three*

- R1: Decrease time for delivery of unstocked parts or items to battle force.
- R2: Increase self-sufficiency In battle force for repair parts and spares
- R3: Reduce repair parts/spares inventory redundancy
- R4: Reduce manning for inventory control and transportation.

Habitability & Support Goals Priority Four

- H 1: Reduce crew size
- H2: Maximize at sea period and quality of food supply
- H3: Improve training at sea

and subsequently added . . .

Logistics Support Chain Goals

- L1: Increase ratio of fighting ships to total force
- L2: Reduce transshipments for replenishment

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Force or Architecture / Goal Matrix (logistics)

	Conv	Mod	Mother	LowOb	DistrAir	Robo	Obiwan	Nuc	Low>Burst
F1:fuel freq	○	●	●	○	○	○	○	●	●
F2:fuel tac	○	●	●	○	○	○	○	●	●
F3:fuel stock	○	●	○	○	●	○	○	●	●
F4:fuel man	○	●	●	○	○	●	○	●	●
O1:ord freq	●	●	●	●	○	○	●	○	○
O2:ord tac	●	●	●	○	●	○	●	○	○
O3:ord inven	○	○	●	●	●	○	●	○	●
O4:ord man	●	○	●	●	○	●	●	○	○
R1:time down	●	○	○	○	●	○	○	○	○
R2:self-suf up	○	○	○	○	○	○	●	○	○
R3:redundant	○	●	○	○	○	○	○	○	○
R4:parts man	●	○	●	○	○	●	●	○	○
H1:less men	○	●	●	○	○	●	○	○	○
H2:food	○	○	○	○	○	●	○	○	○
H3:training	●	○	○	○	○	●	○	○	○
L1:fight ratio	○	○	●	●	○	●	○	●	●
L2:shuttle > 2	○	●	●	○	○	●	○	●	●

● = meets 2010 goal ● = improvement toward ○ = same or worse than current capability

OUTLINE

Planning Timeframe

Producibility Framework

Battle Force Concepts

➔ An Alternative BF Architecture: $D^3 + S$

**Carrier Dock Multimission: Ship concept
within $D^3 + S$**

Impact of CDM on Industrial Infrastructure

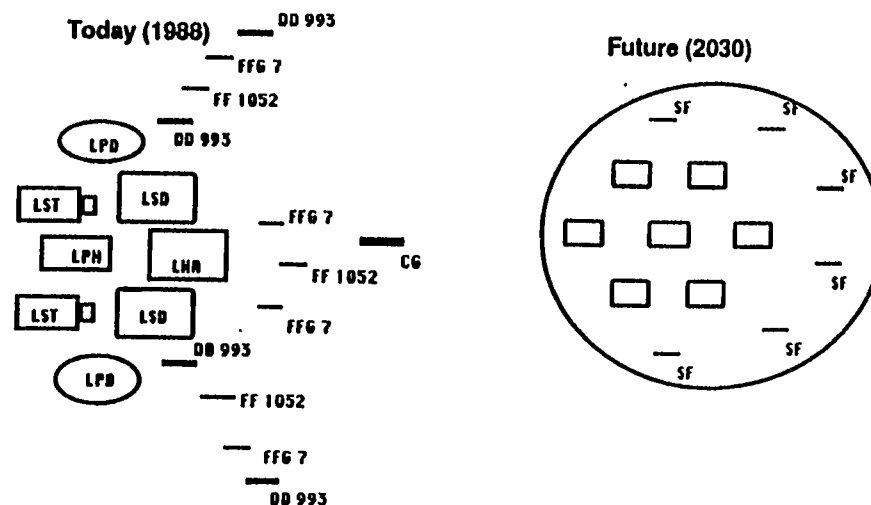
Summary

D³ + S Battle Force Architecture

(Distribute, Disperse, Disguise and Sustain)

- ◆ only two types of ships... Carriers of Large Objects (CLO)
Scout Fighters (SF)
- ◆ lower signatures, higher endurance than today's force
- ◆ concept incorporates not only amphibious force but also underway replenishment group, surface action group and carrier battle group
- ◆ signatures of all CLO's, all SF's are identical; CLO & SF signatures are made as similar as possible. CLO's are functionally similar as well.
- ◆ same or similar systems are used in all ships, ie same propulsion plant, same human support.
- ◆ start phasing ships being built to fit better into this architecture (make common system decisions before the first CLO/SF is built; forwardfit signature reduction)

The Changing Amphibious Task Force



Force or Architecture / Goal Matrix (logistics)

	Conv	Mod	Mother	LowOb	DistrAir	Robo	Obiwan	Nuc	Low>Burst	D ³ +S
F1:fuel freq	○	●	●	○	○	○	○	●	●	●
F2:fuel tac	○	●	●	○	○	○	○	●	●	●
F3:fuel stock	○	●	○	○	●	○	○	●	●	●
F4:fuel man	○	●	●	○	○	●	○	●	●	●
O1:ord freq	●	●	●	●	○	○	●	○	○	●
O2:ord tac	●	●	●	○	●	○	●	○	○	●
O3:ord inven	○	○	●	●	●	○	●	○	●	●
O4:ord man	●	○	●	●	○	●	●	○	○	●
R1:time down	●	○	○	○	●	○	○	○	○	●
R2:self-suf up	○	○	○	○	○	○	●	○	○	●
R3:redundant	○	●	○	○	○	○	○	○	○	●
R4:parts man	●	○	●	○	○	●	●	○	○	●
H1:less men	○	●	●	○	○	●	○	○	○	●
H2:food	○	○	○	○	○	●	○	○	○	○
H3:training	●	○	○	○	○	●	○	○	○	●
L1:fight ratio	○	○	●	●	○	●	○	●	●	●
L2:shuttle > 2	○	●	●	○	○	●	○	●	●	●

● = meets 2010 goal ● = improvement toward ○ = same or worse than current capability

D³ + S Architecture

Aimed at Removing the Source of Force Problems:

- ▣▣▣▣ **Observability of Ships**
 - ▣▣▣▣ **Signature Discriminatability**
 - ▣▣▣▣ **Concentration of Functions**
 - ▣▣▣▣ **Logistically Demanding**
 - ▣▣▣▣ **Programatically Demanding**
- Allows Enemy to mass firepower
beyond our own defenses
- Loss of one ship means loss of
commodity
- Long, demanding logistics tail is
expensive and vulnerable
- expensive and time consuming

Objective: Reduce inherent vulnerability by:

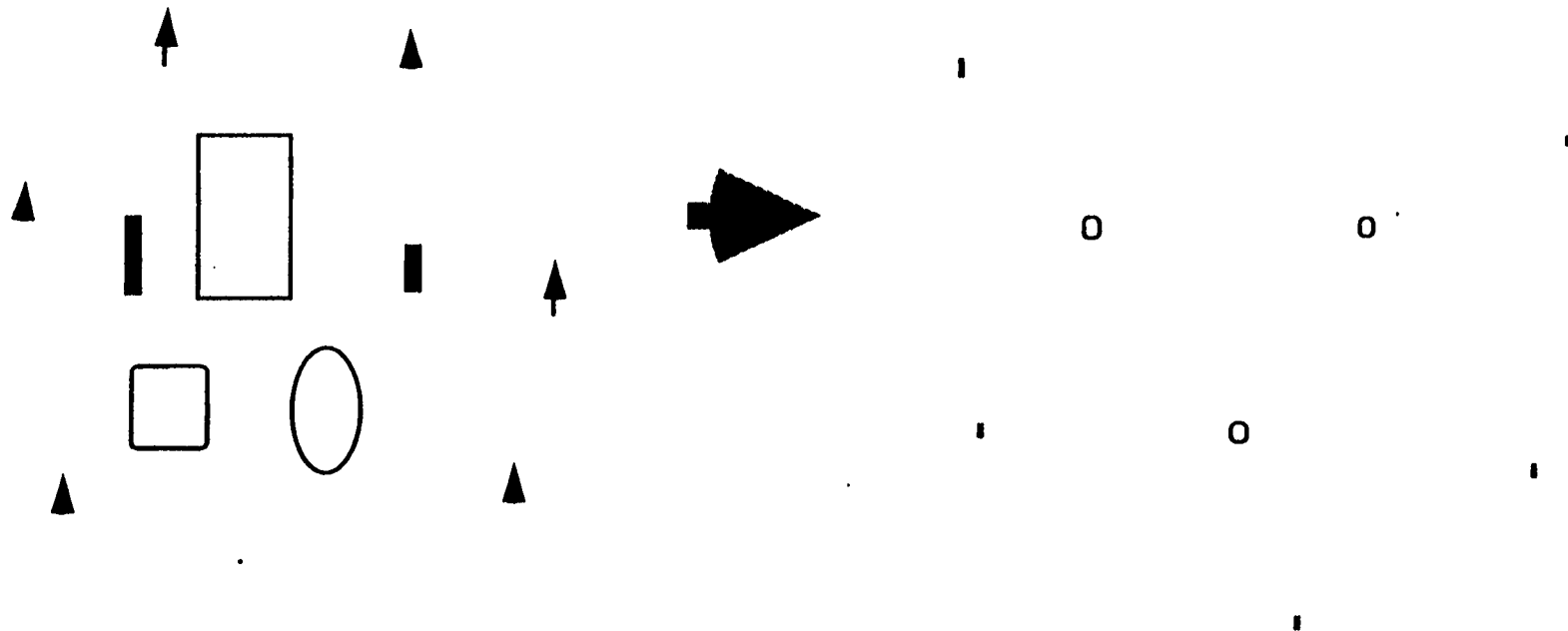
**Distributing, Dispersing, Disguising assets and
reducing extent and vulnerability of logistics
support by . . .**

Sustain (design for long staying power)

Proposed Force Level Group Change

today (1989)...

future (2030)...



Key Reasons for Proposed Change in Architecture

■ Increased Military Effectiveness

- ◆ Shrinks Red's battlespace well within Blue's battlespace
- ◆ Negates Red's massing firepower on Blue's high value units
- ◆ Enhances effectiveness of Blue's decoys

○ Reduced Cost

- ◆ Reduced cost through standardization allows either more units or higher quality units

resulting in . . .

RADAR SIGNATURE

2010 SURFACE COMBATANT

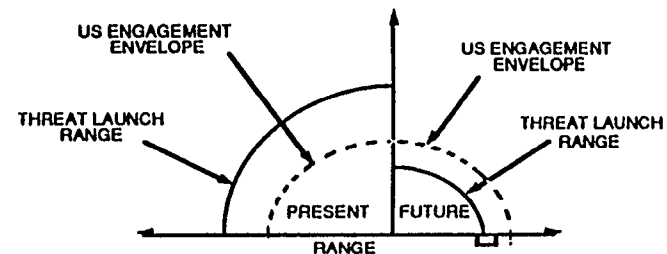
Anthony Johnson (NAVSEA 55J) 692-0128

Mike Sekellick (DTRC 1412) 227-2570

GOAL

- Reduce radar cross section by _____ dB versus the DDG-51 baseline.
- Improve radar countermeasures by at least _____ dB.

BATTLE SPACE



- Reducing ship RCS decreases threat launch range (100-200%)

JUSTIFICATION

- With sufficient RCS reductions the hostile platform (surface or air) will have to come within own ships weapons envelope before detection thus enabling destruction of the archer vice his arrows.
- A decrease in RSC also improves a decoys ability to seduce an incoming radar guided missile.

METHODS

- Remove functions from topside.
- Shaping
- Materials

September 1989

RANGE / ENDURANCE

2010 SURFACE COMBATANT

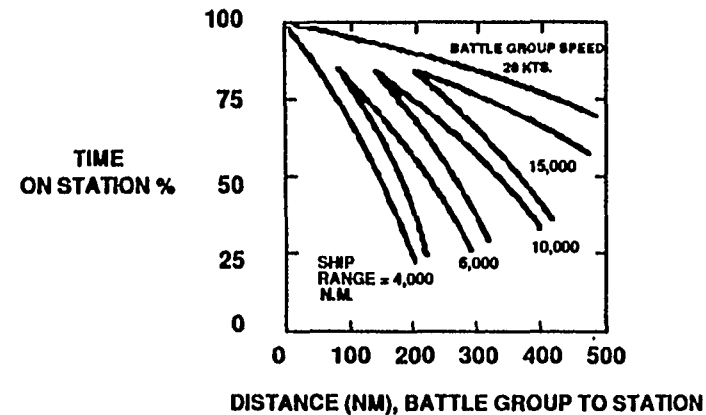
Richard Wyville (NAVSEA) 692-9462

Tim Doyle (DTRC 272) 267-2564

GOAL

- Range of _____ NM at 20 knots

RANGE AND TIME-ON-STATION



JUSTIFICATION

- More activities in the Pacific and Indian Oceans are projected where inherently longer transits will be exacerbated by a loss of bases and uncertain sources of fuel in time of crisis.
- Reduce dependence on vulnerable logistic train.

METHODS

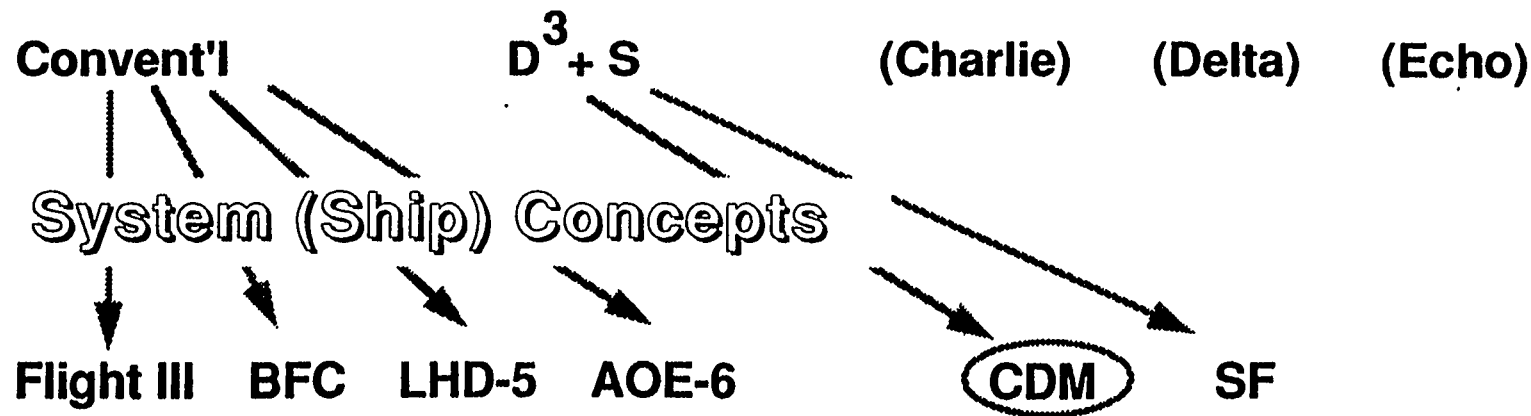
- Fuel efficient engines
- Efficient propulsor
- Low resistance hull forms

Hierarchy

Force Concepts

Convent'l Modular Dispersed Air Robo Obiwan Nuclear Low>Burst

Force Architectures



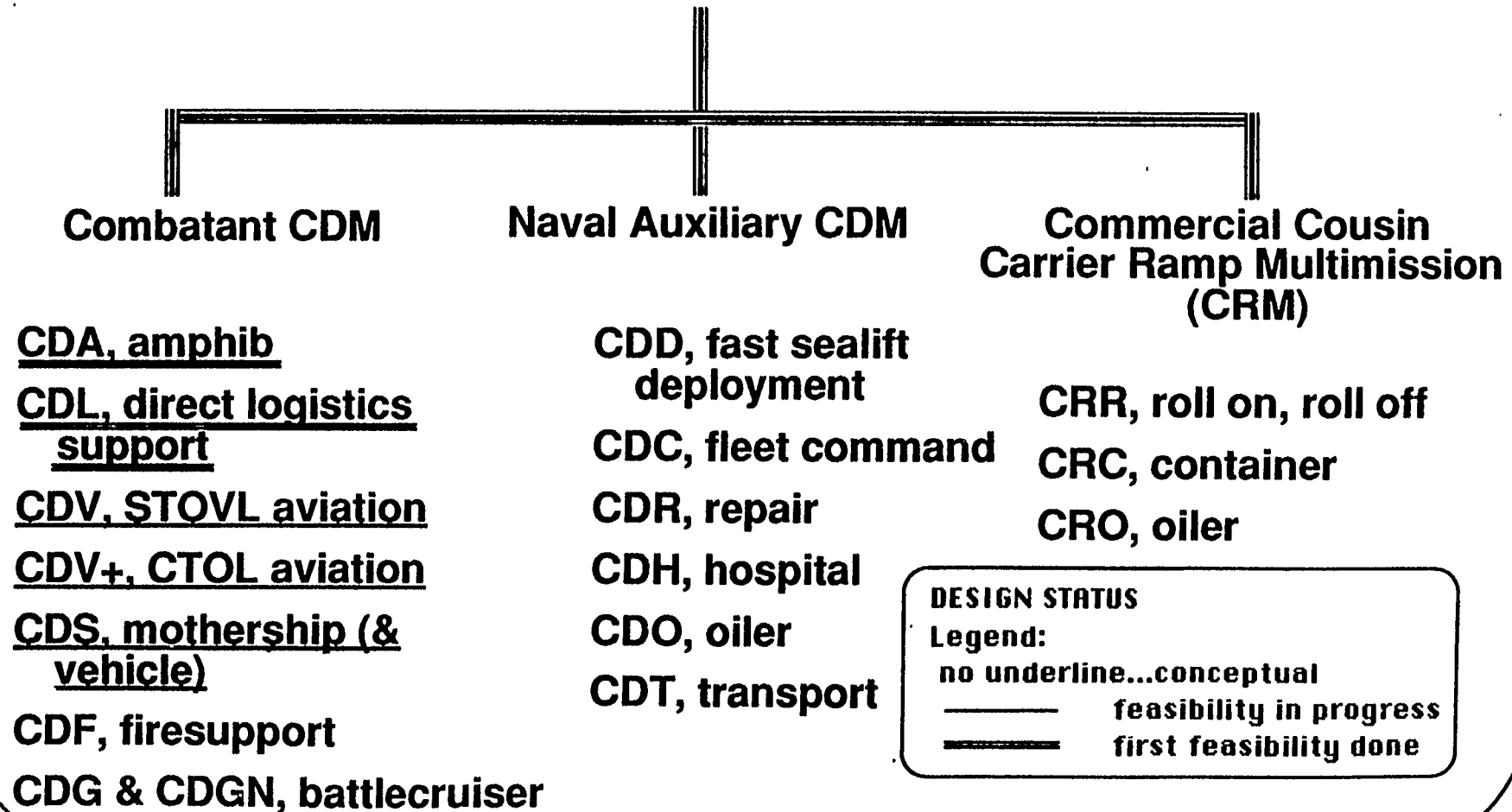
Carrier Dock Multimission (CDM)

Concept: A generic ship to be configured to carry the large objects vital to naval missions.

Conceived as multi-product ships in less than ten variants, each variant as similar as possible to the others and covering a particular warfare niche.

Carrier Dock Multimission Overview

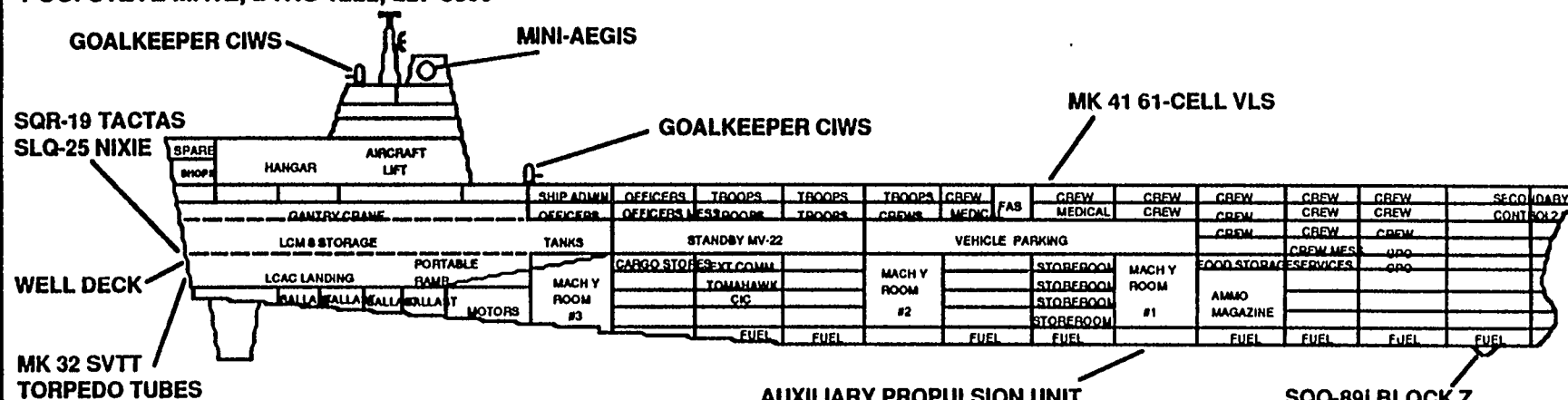
Carrier Dock Multimission (CDM)



- 79 -

POC: STEVE MATZ, DTRC 1222, 227-3599

DATA DATE: 25 MAY 89



LBP:	730.0 FT
LOA:	760.0 FT
BEAM:	105.0 FT
DEPTH:	83.0 FT
DRAFT:	29.4 FT
ENDURANCE:	15000 NM
DISPL, FULL LOAD:	34590 LT
DISPL, LIGHT SHIP:	20000 LT

	SHIP	AVIAT	TROOP
OFFICERS	56	13	66
CPO	58	2	68
CREW	697	31	816
TOTAL	811	46	950

IOC: 2000

AUXILIARY PROPULSION UNIT

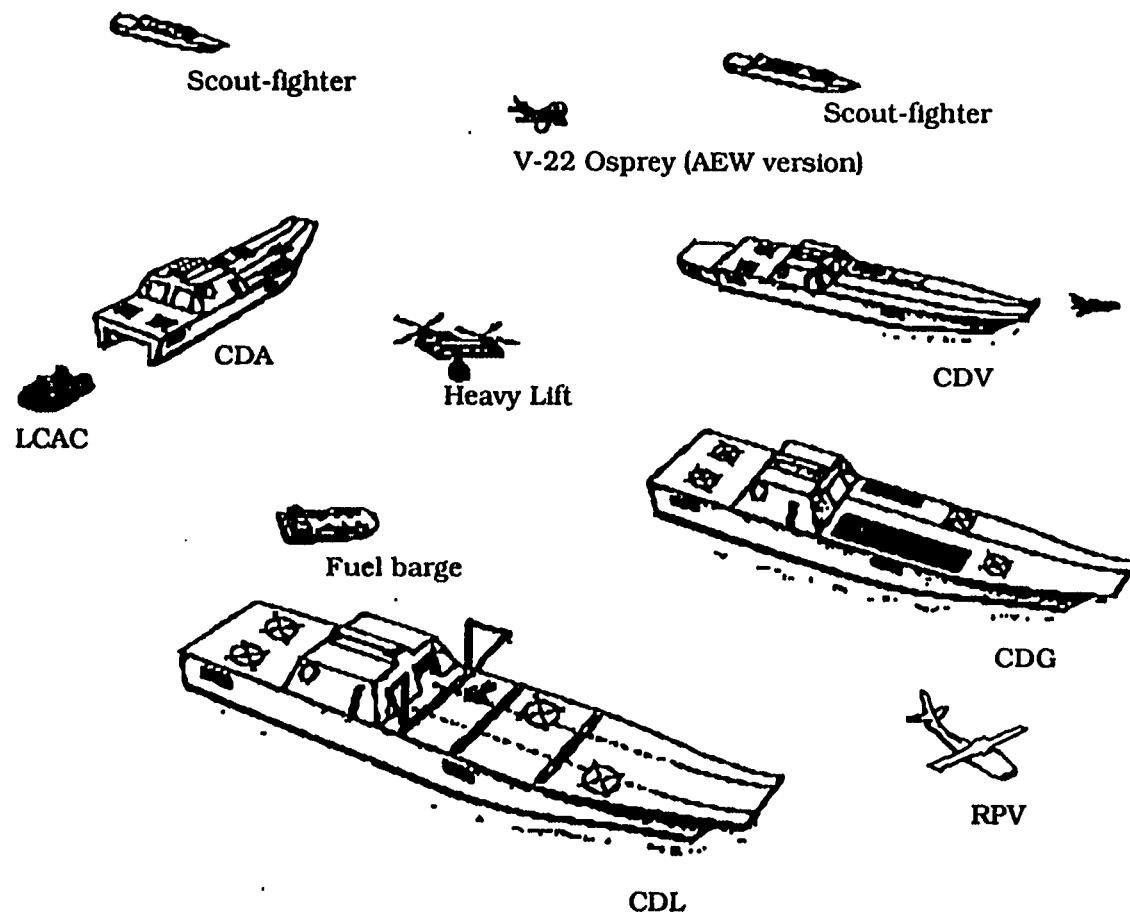
INSTALLED HP:	70000 HP
INSTALLED KW:	15000KW
CRUISE LOAD KW:	7230 KW
BATTLE LOAD KW:	TBD
SUSTAINED SPEED:	24.1 KT
KG, FULL LOAD :	41.4 FT
KG, LIGHT SHIP:	51.3 FT

PAYLOAD:

VEHICLE (FT2)	21000
CARGO (FT3)	37000
LCACS	2
BOARS (LCM 8 EQUIVALENT)	4
CONTAINERS (8' X 8' X 20')	16
CARGO FUEL (BARRELS)	6430

**AIRCRAFT: 2MV-22, 2CH-53E, 6 STANDBY MV-22
(all aircraft in hangar)**

Carrier Dock Multimission (CDM) Variants [Conceptual]



This is not a typical grouping, as various task organizations would be made to support a particular mission. For instance, an amphibious mission might have ...

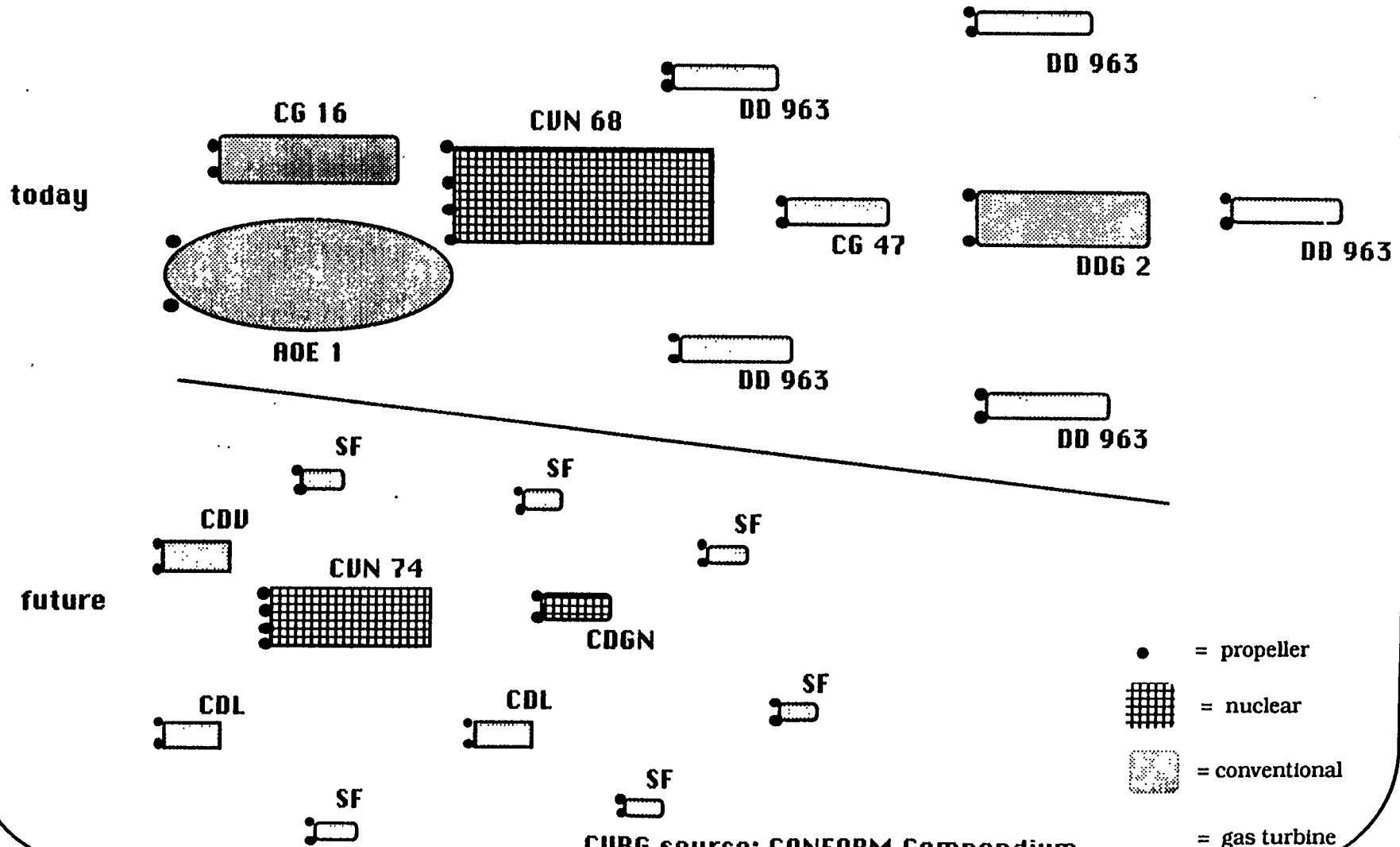
- * 6 CDA
- * 1 CDG
- * 1 CDV
- * 6 Scout-fighters

The conceptual CDV has a possible pusher-tug for additional speed, use as a fuel barge or to propel a mobility-damaged CDM within the task group.

CDA = amphibious variant
CDL = logistics variant
CDV = air capable variant
CDG = large guided missile variant

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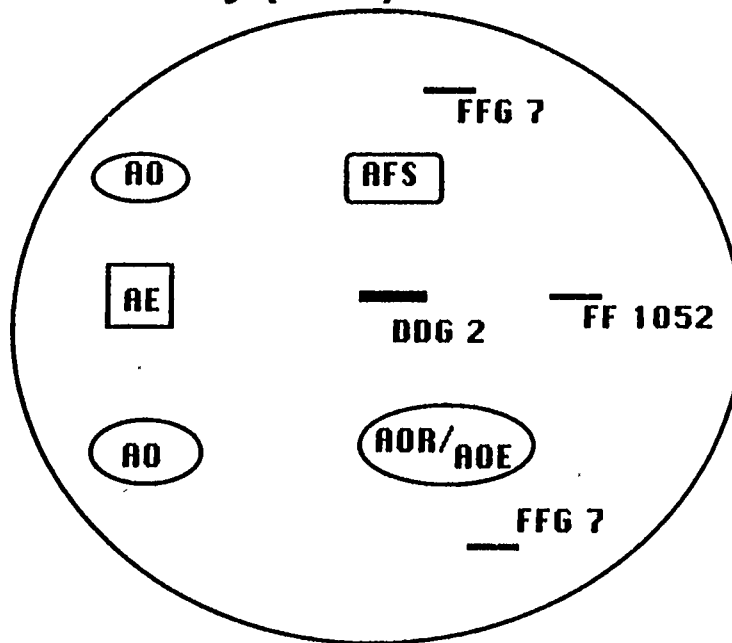
Transition to 2030 CVN BG



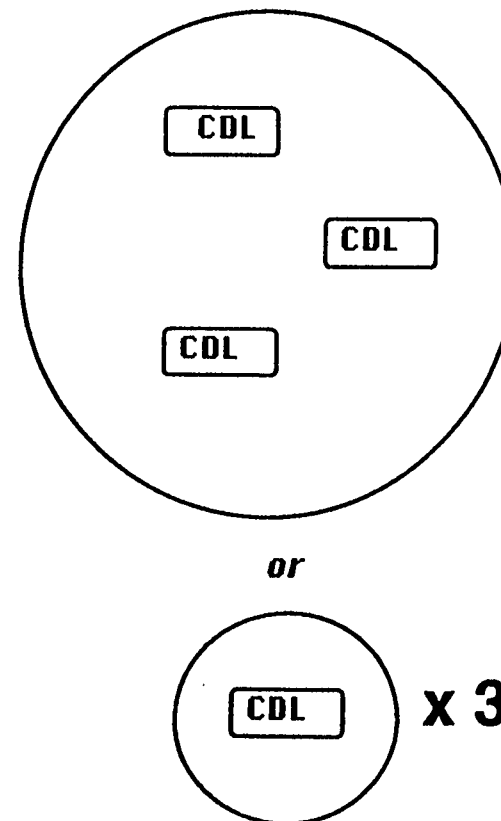
CVBG source: CONFORM Compendium

The Changing Unrep Group

Today (1989)



Future (2030)

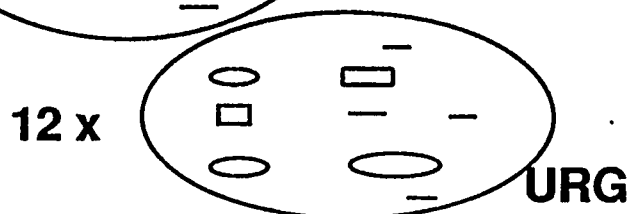
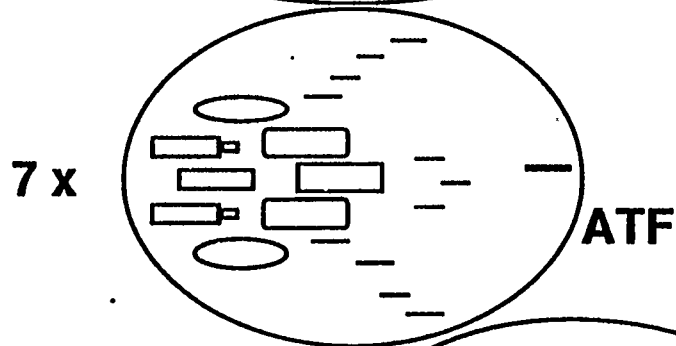
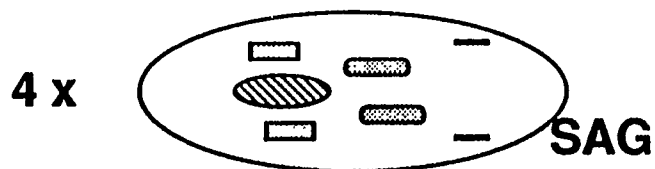
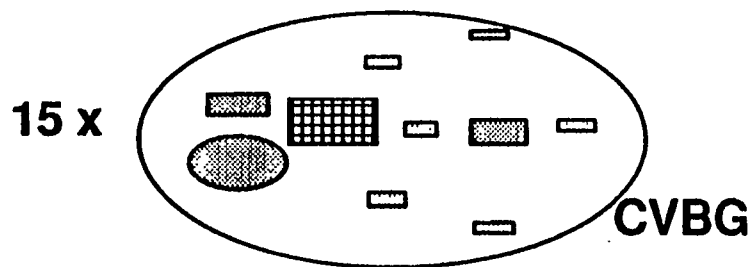


URG source: CONFORM Compendium

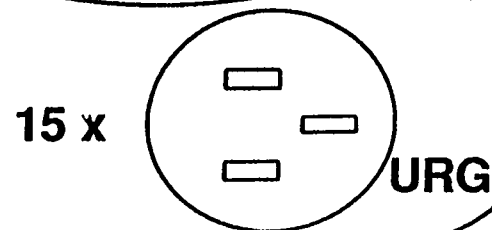
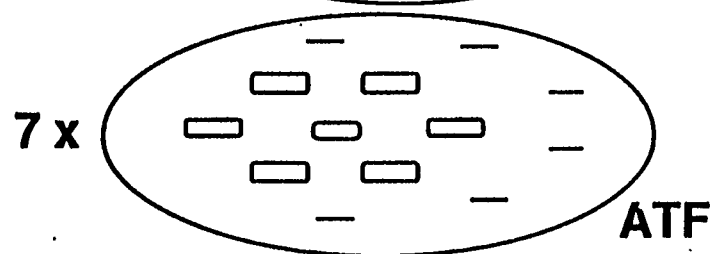
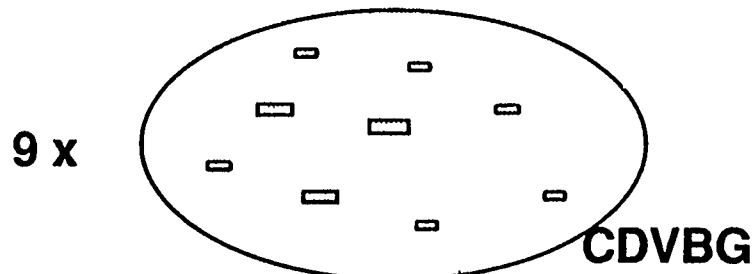
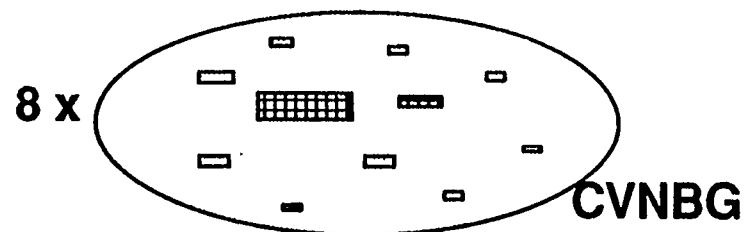
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A CLO and SF based Force Level Group Structure

TODAY (1989)



FUTURE (2030)



Impact of Carrier Dock Multimission on the Industrial Infrastructure

If Navy will commit to large ships in longer production runs (as has happened for smaller surface combatants) then increased capital investment and longer range planning by shipbuilders would be encouraged.

Program cost reductions (going from 9 classes in 10 years to two basic classes, CLO and SF, in projected 10 year period 2010 to 2020) could enable more money going to shipbuilding contracts rather than programatics.

Fewer ships overall (89 vice 113) but more tonnage due to increased percentage of large ships (CLO's).

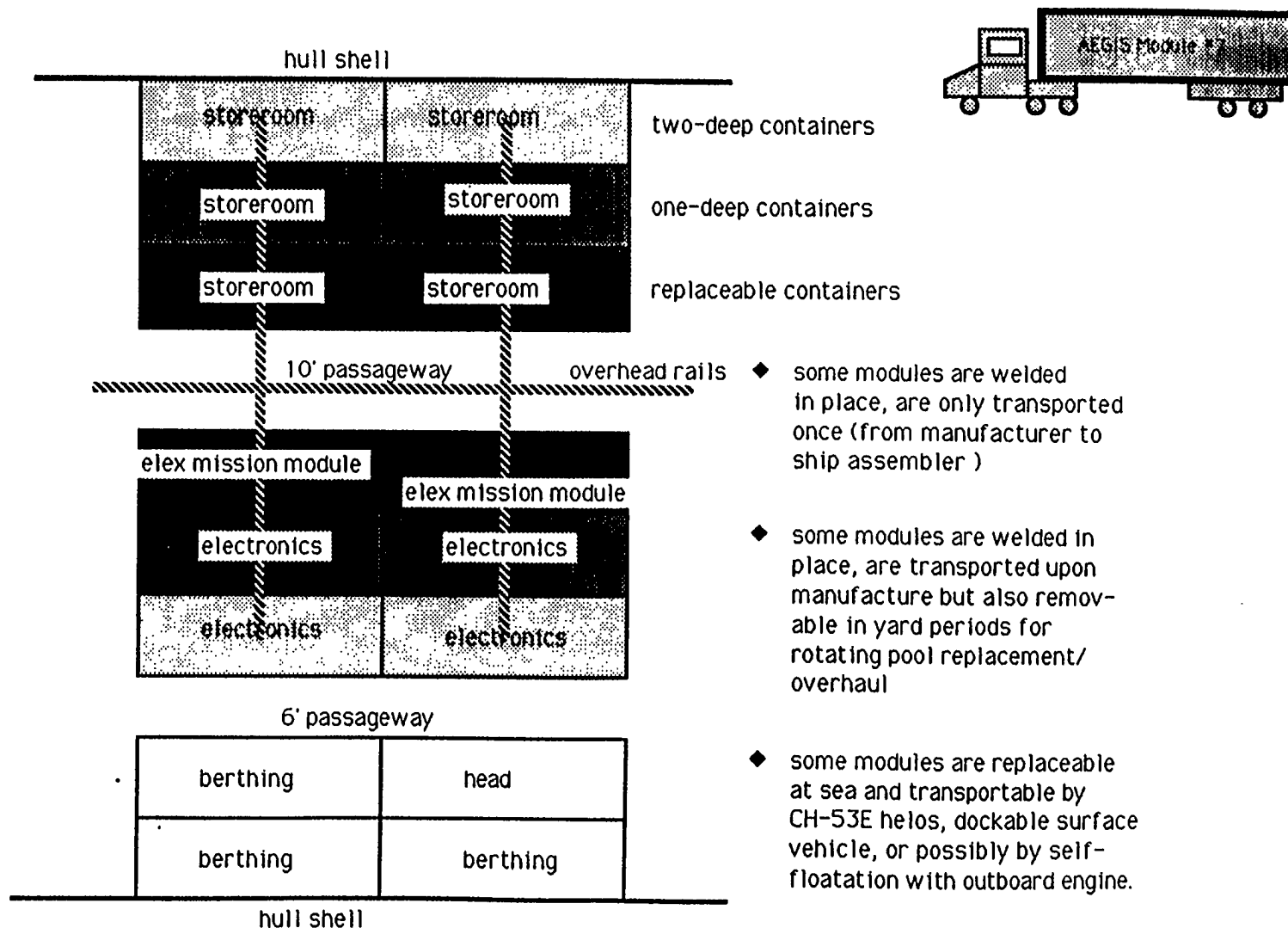
Virtual monopoly of gas turbine, electric drive propulsion plants for naval combatants (big and small).

Revision of Naval acquisition & support infrastructure to deal with greatly increased commonality; likely initial confusion.

Greater modularity / containerization could encourage shipyards to become assemblers of components manufactured elsewhere, to even greater extent than today.

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Phased Modularization / Containerization



◆ some modules are welded in place, are only transported once (from manufacturer to ship assembler)

◆ some modules are welded in place, are transported upon manufacture but also removable in yard periods for rotating pool replacement/overhaul

◆ some modules are replaceable at sea and transportable by CH-53E helos, dockable surface vehicle, or possibly by self-floatation with outboard engine.

Systems Engineering

Vision

Reality

SUMMARY

- ◆ **Considering logistics and acquisition from very inception of battle force concept formulation is valuable.**
- ◆ **Battle Force concepts each contributed to first alternative Battle Force Architecture (D³ + S).**
- ◆ **Systems engineering required to develop concepts to a point where they can be assessed and compared.**
- ◆ **Carrier Dock Multimission is a start on this definition process.**

Questions?

☐ Increased Military Effectiveness

- ◆ Shrinks Red's battlespace well within Blue's battlespace
- ◆ Negates Red's massing firepower on Blue's high value units
- ◆ Enhances effectiveness of Blue's decoys

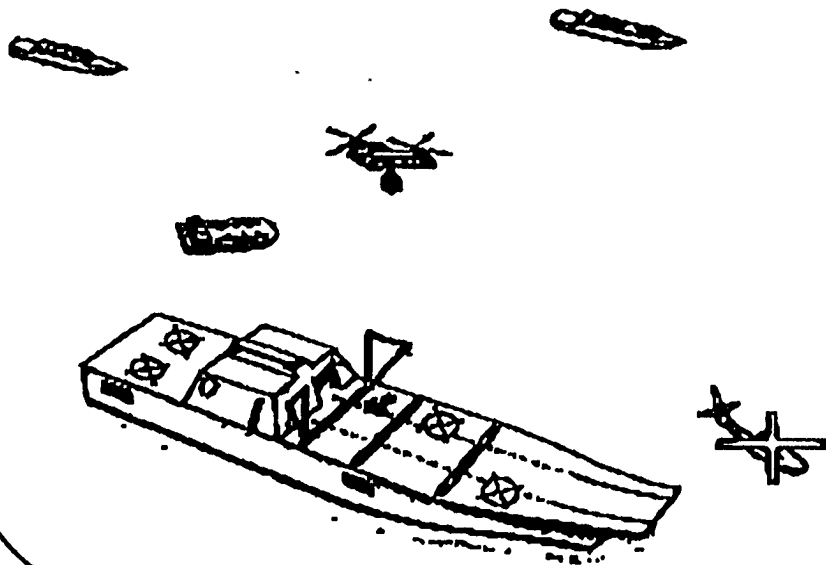
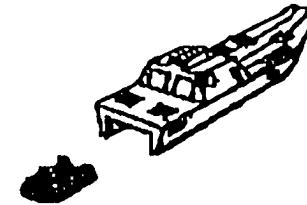
☐ Reduced Cost

- ◆ Reduced cost through standardization allows either more units or higher quality units

resulting in ...

why cdm?

- ◆ Disguise ships within taskgroup
- ◆ Balance ships within smaller taskgroup
- ◆ Reduce ship design costs
- ◆ Reduce program costs
- ◆ Reduce production costs
- ◆ Expand shipbuilding base
- ◆ Improve ship availability
- ◆ Reduce logistics support
- ◆ Disguise which taskgroup is which
- ◆ Graceful, gradual transition; flexibility



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Fleet Transition and Future Composition

	TYPE	NUMBER		FUTURE (2030)		
				TYPE	NUMBER	
T O D A Y	CUN	5	→	CUN ✈ 3 > 12 (8)	3=current orders only; 12-max	
	CU	10	→	CDU ✈ 8 > 32 (19)	Carrier of Large Objects (USTOL)	
	BB	4	→	CDF	8	CLO (Fire Support Ship/Strike)
	CGN	9	→	CGN	3 > 12 (8)	one CGN for each CUN
	CG	32	→	CDG	19	CLO (Guided Missile Transport and Launch)
	DDG	37	→	SF	160	Scout Fighter
	DD	31	→			
	FFG	46	→			
	FF	49	→			
	LCC	2	→	CDC	2	CLO (Command Ship)
	LHA	5	→			
	LPH	7	→	CDA	42	CLO (Amphibious)
	LPD	13	→			
	LST/LSD/LKA	32	→			
	AOE/AOR	11	→	CDL	45	CLO (Logistics)
	AO/AE/AFS	49	→			

✈ Buy decisions on CVN vs CDV to be made based on future VSTOL technology development; 3 CVN = 8 CDV assumed

total: 342

total: 311

February 1989

2030 CDM / SF Fleet Makeup

Stabilized Number (+ reserves)	Class	Production Rate	Active Life (yrs)	Reserve Life (yrs)
8 (+2)	CVN	one every 5 or 6 years	45	10
8 (+2)	CGN	one every 3 or 4 years	30	10
19 (+5)	CDU	one every 1 or 2 years	35	10
42 (+12)	CDA	one or two every year	35	10
45 (+13)	CDL	one or two every year	35	10
19 (+6)	CDG	one every 1 or 2 years	30	10
2 (+1)	CDC	replacement	30	15
8 (+2)	CDF	one every 4 years	35	10
160 (+64)	SF	six or seven every year	25	10

311 (+107)

- these numbers are CDM/SF replacements for current task force (CVBG, SAG, ATF, URG, CEG) only. Mine warfare, non-direct support logistics, repair/tender not included.

- ships with inherently hardmounted primary mission payload (CGN, CDG, CDC and SF) are assigned a shorter active life. Larger ships get a longer active life than smaller ships (notably the SF) as backfits and extensive modernizations are severely curtailed in favor of new construction. The CVN assumes SLEP at 30 yr point.
- the concept of flexible transition is used...first half of active life in highest threat environment, second half in lower threat, activated reserves to merchant escort and transport duties.

Planning for the Future

By : RADM Dean Hines

Proclamation

First sentence of the proclamation is very timely. The campaign objectives are to demonstrate our industries cooperative, initiative and commitment to achieve and continuous productivity and quality improvement and goes on after that but you will hear me mention those words again before I finish. Achieving continuous improvement in our processing that we are involved in has never been more important as far as I am concerned than it is today. As I was mentioning to somebody earlier that we were discussing that these are exciting times both to the public and private naval shipyards and public and private sectors and I think that the first and most important step in looking at where we are going is to do some planning for the future. Wayne Breski, someone you may be familiar with since Wayne Breski is a hockey player of some note and good at his business, he says I skate to where the puck is going to be and I don't think that we always skate to where the puck is going to be. That's what makes Wayne Breski better than some of his contemporaries and I would suspect that some of us are lagging a little bit behind because we don't always do that. To me that implies the importance of some strategic planning, some looking forward to where we are going and what we are dealing with. If we are dealing with the shipbuilding and ship repair industry or anything else, our own personal lives or whatever. Some long range strategic planning is extremely important if we are going to get somewhere. I think

it was President Eisenhower who said that there is as much value in the planning effort itself as there is in the final plan that we come up with and sometimes we don't come up with a final plan. But the very business of thinking about the future and where we are going and what-s important is vital of course. The naval shipyards, the eight naval shipyards, have just concluded a strategic planning for the next 5 years and we are writing up the minutes of that now and will publish it, hopefully, in the next month or so. That's one of the reasons that we did that is that we were not able to purchase as a group, as a corporation and not that in a very open form before. In doing that it became obvious that one of the things we have to look at is realistically of what we are facing. I think we have been caught too often in the trap of looking at what we would wish the future to be and not opening our eyes and the stuff to do with C&P what is the future is really like, what can we honestly really expect. It's hard to do that. It takes slot of effort but it is certainly time well spent to take that effort. We have been caught in the past in pulling up ours in chasing our tails. We don't do what Breski does, we have been caught in chasing the symptoms. We find ourselves kind of in a position of a dog in a dog sled team who is not the lead dog. If your not the lead dog the scenery does not change very much and that's kind of the situation that we are in. What do I see downstream for the shipbuilding and ship repair industry? Well for the private sectors the Navy is going to be the primary customer. The Navy right now consists of something like 95% of the work for the private sector and I think

for the future as I see it the Navy will continue to be the primary customer. Although when I read some of the literature that comes out I am a little bit enthused and I think the future is not complete. I do see some of the private sector shipyards getting involved in some shipbuilding for the commercial market and although small there is a little bit. I think that there is a bright spot in the future and I think that it is vital for the private sector to continue to pursue that because frankly the Navy is not going to save the private sector shipbuilding and ship repair industry. There is just not enough work in the Navy to do that. The Navy's different from what was a few years ago. If you go back 15 or 20 years the Navy was slot bigger than what it is now. The ships were all fossil fueled, partially all fossil fueled with the exception of nuclear power ships and a few diesel ships and they were very labor intensive. Our maintenance philosophy was much more labor intensive in those days. That was the days before the phase maintenance availabilities came about. The Navy's changing in that those fossil fueled ships are disappearing. There are still a few around and there will be a few around for several years yet but you all readily recognize that we have fewer and fewer steam boilers on our ships in the fleet today. We are going to gas turbine, diesel and nuclear propulsion with every new construction ship we are building in the Navy. Those ships are designed from the beginning to be less labor intensive and require less maintenance work. That is a conscious decision on the part of the Navy in order to save money. In fact, it does because on gas turbine ships clearly gives a much more modular rise of plug-in, plug-out, sort of a

plant. As a result of that the total repair and overhaul work in the Navy is decreasing even if the number of ships increases and the number of ships is about as high as it is going to get for a while, and the work is actually decreasing. I think that we have some strong points in our favor, in our court. I heard some guys saying that the private and naval shipyards, and private companies account success on the number of employees they have. I don't think that's a legitimate measure for success or behavior. I particularly don't think that's going to be a legitimate measure for success or behavior in the future. We tend to use the abilities that we have, and we have special abilities, to adapt new technologies to the shipbuilding and ship repair industry, and the number of employees will in fact decrease because if they don't we are not doing our job right. We have to watch over the young people entering shipbuilding and ship repair industry that have been educated in industrial engineering are industrial engineers (IEs). They have lot of good ideas. They probably have more good ideas than some of us had when we were nominated and some of us had when we were at their stage in life entering the workforce. I don't think we always use those young folks to our best advantage. For whatever reason we continue on in our ways and use IEs too much in the firefighting arena instead of using them to plan ahead and look at our processes season and how we can improve our processes.

Where we have used them properly, as I consider properly, then they have paid their laid many times over as I did. We ought to take advantage of that. That's a strong suit but I am not sure our competition has. We have some good planned facilities. I am not new to all the private shipyards. I have inhibition to the 8 naval shipyards holding the 15 supervisor shipbuilding offices that are in NAVSEA-07 and I have tried to visit the private shipyards, and I have been to about two thirds of them and I intend to visit the rest of them. What I have seen in the facilities availability has been kind of exciting. I have seen private shipyards using their facilities much better than I did 10 or 15 years ago to much more productive ends. The Navy shipyards have excellent facilities. They certainly can get better, they can do it better in facilities planning although I think we have some pretty good facilities. Our workforce is very intelligent. When I talk about workforce I am not talking about the white collar folks that sit in the offices and make big decisions and think they run the shipyard. I am talking-about the people deep down on the deck plates, down in the shops, and down on the ships. They are a very intelligent group of people. Many of them are college educated and if you didn't realize that you might take a check at that sometime in both private and public sectors. We are not dealing with dumb people by any means. As a strong suit in our favor we are capitalized on that the future we are on apt to look at on how we treat our workforce. Instead we can constitute that say in the year 2000 five out of every six individuals in our workforce will be either one minorities or 5 out of 6. We ought to be thinking right now

about how we are. going to use those folks and how we are going to change our methods of operation because please donut think that your work force 10 years from now is going to look like it does now or like It was 10 years ago. It's going to be different. We ought to be smart enough to plan for that and I think we have to if we are going to survive in this business. In addition, we will be competing with other industries in this country that have the same workforce and let me tell you in talking with a few younger folks in naval shipyards at least I found out that in many cases because we did not know how to use them properly they sometimes look for employment elsewhere where they can get something exciting to do and so we are going to have a challenge in competing with those private industries that are not in our business and those scarce assets. I think the biggest challenge in the next 10 years is not going to be political. I think the biggest challenge for us is going to be environmental rules and regulations. I have seen some private sector companies go belly-up because of the environmental rules and regulations that continue to grow on a state and local levels. They change continuously and believe me I am not against the environment, in fact, I am going from this meeting to see a special group for the rest of the day to meet with a private sector, with the folks like the EPA and the National Wildlife Federation Society, to try to understand each other better and I myself belong to some of those organizations so I am awfully inclined. I think that we as an industry have to be very conscious of how those rules and regulations and requirements are changing and be sure that

we keep up with it. It is not in my estimation in something that we can fight nor should we fight it. We are going to have to bite the bullet and get on with it and change our destination as it needs to be changed. But I am concerned that if we aren't very careful in how we attack and manage the environmental rules and regulations that are coming downstream and. they could put us out of business because all we have to do is walk around the waterfront in some areas of the country right now and see what some ship repair companies are doing in the naval shipyards because of the environment and you can find that it is very expensive, very costly, and that concerns the future. I think that it is extremely important that in both the naval shipyards and the private sector shipyards we pay more attention to safety in the well being of our employees. Those are vital assets that we are dealing with. There are many people that are getting hurt on the waterfront everyday. Some private and some naval shipyards are better than others in managing the safety programs but still we can't afford to have people getting hurt. Primarily, because everybody loses if somebody gets hurt on our property, nobody wins. And secondarily, it is going to start costing us money in compensation costs and tremendous amounts of dollars we are losing in that area. I mentioned the proclamation before and continuous improvement and t-hat-s written in the first line of the proclamation. As far as I am concerned that is our salvation and if there is a salvation for the Navy and the DOD it has to be in what they call TQM (Total Quality Management). There are slot of procesees out there available, quality improvement processes,

they are all about the same thing. They all talk about the same thing. You will find qualities of Dr. Denning, Dr. Jeran and Bill Crosby and all kinds of people who have programs that will sell to you. There is not much difference frankly in that they all drive the same thing. Everybody is involved in the process and frequent business and we need to make use of that capability that-s out there. We need to attack the processes we are dealing with. Processes everywhere from the board room, if you will, all the way down to the deck plates. They are all important in making improvements that cover the safety. It will apply environmental, personally in anything and everything they do. I would suggest we not worry too much of whether we are following Dr. Denning or Dr. Juran or whoever. That-s not the important thing. The important thing is we follow somebody where we do something in the way of improving your processes. Several of the naval shipyards are well on the way to embracing the quality improvement processes. I know that in the San Diego area the private shipbuilders and the ship repair companies have joined together with the supervisor down there to attack the quality improvement processes and systems to everybody's benefit and I would urge you to consider it if you have not already. The issue of continuous improvement will never end. Fifty years from now someone can stand here and say the same words. It will never end. But if it does not start we are going to find ourselves in deep trouble in the future. Those are my thoughts that I wanted to pass on.

STATUS OF U.S. SHIPBUILDING AND SHIP REPAIR INDUSTRIES

By : John Stoker

I have been asked this morning to speak on the subject on the current status of the shipbuilding and ship repair industries in the United States. Also to address the importance of the NSRP program to the shipyards as well as the role of the industrial engineers in that program and I should begin by saying that we are absolutely convinced of the necessity of maintaining support for the NSRP because we think it is fundamental to the revitalization of the industry that we hoped would take place over a course of the next few years. For those of you who don't know very much about the council let me put up some information about it. Next year will be our 70th anniversary, we were founded in 1920, we represent the ship construction and ship repair marine equipment and service industries in the United States. We currently represent 26 shipbuilders and ship repair firms. In fact, with the application of the Trinity Marine Group that will increase to 27 this month. So we virtually represent every major shipyard and ship repair firm in the United States. We have 18 allied industry members those whose companies manufactured components that are installed in new construction vessels around the United States. We also represent 3 naval architecture firms and we represent well over 95% of the employment base in the U.S. as well. In fact, it's really quite odd but as the situation that shipbuilding has gotten worse the association tends to do better, I don't know whether that's good news or bad news. Let me cover for you this morning the status

of the shipbuilding and ship repair industries in the United States. Also I want to talk to you a little bit about Section 301 petition. I want to explain what that is, why we filed it and what relevance that might have to you. I want to head on the highlights of the shipyard recovery plan that we have been presenting to the Congress over the past year and really is the fundamental philosophical through us that let the House Merchant Marine Committee to increase funding for the NSRP as well as initiating some new programs in terms of new ship design for the future. Then I want to talk about the NSRP and the role of IE in that program. Just to make sure that everyone understands how grim its been this chart identifies for you the employment level and number of shipyards that existed in 1982 where we are and we were in October 1988, and where we expect to be by close of business in 1990. The interesting thing is that the industrial base for the DOD is shrinking, not just in shipbuilding, it-s across the board. The number of firms that dropped from 118,489, were doing business in 1982 to sell 38,007 in 1987 and slot of various associations from around town that represent the airframe manufacturers and electronic component manufacturers and so on have been trying to articulate the same message to DOD that the really strange thing that occurred in the rebuilding of the defense department over the past few years is that the number of companies engaged in that is actually declined. In 1984 the Navy and MARAD mobilization base analysis found that 110 private sectors shipyards provided marginally adequate mobilization potential and this study was based on October 1, 1982, data. At that time they found that there were 110 shipyards open with 112,000 production workers in this range from everybody including

Newport News Shipbuilding right on down the chain to the smallest topside repair firm that could be found on the 3 or 4 coasts if you count the Great Lakes. As of October 1, 1988, of that original 110 shipyards, 43 closed and over 33,000 production workers have left the workforce, that's a decline of about 39% of the base. There are two major contributing factors for this decline. The first was the class of the commercial shipbuilding and ship repair markets which I will address in a few minutes plus the other inevitable trend was the concentration in the Navy shipbuilding and fewer shipyards. Now up until 1980 shipbuilding backlogs was roughly half Navy and half commercial and you can see on this chart that in 1976 there were 155 vessels on order of which 78 of them were from commercial customers, 77 were for the Navy, and of course reversed itself dramatically during the course of the 1980's. By the way I would not get too excited about the 1989 increase to 105 vessels on order except included the number of prior programs that were funded in 1987 and 1988 and were not awarded until 1989. The decline began in 1981 when the first term of the Reagan Administration stopped funding CDS (Construction Differential Subsidy) programs for the U.S. flag merchant marine vessels. As a result, the last merchant vessel under construction in the United States was delivered in November 1987. We have not had any new contracts for commercial vessels since 1984 and we now currently have a backlog in January of this year of 80 major combatants, amphibious and auxiliary ships, all for the Navy, and 25 minesweepers, oceanographic research and Coast Guard vessels. Now, one of the factors I identified for you a moment ago was the fact that the Navy shipbuilding work was being now concentrated in so fewer yards which had been the case

10 years ago. Ten years ago 25 shipyards were building Navy and/or commercial ships and we tend to identify this by the way as oceangoing vessels greater than 1,000 gross tons. The five largest yards at that time had 70.1% share of the market. Today there are only 15 shipyards building new construction vessels all of them for the Navy, and the market share of the 5 large shipyards has gone up to 94%. This is not to knock the success of the 5 large shipyard but what it does say is the Navy programs among themselves could not sustain a broader industrial base. Let me just point out to you that in terms of this bow chart here that the marginal shipyards below the top five, in otherwards 6 of the 25 shipyards in 1979 had about 30% of the workload by comparison the smaller base had only 6.2% of the workload so we have quite a few shipyards that are concentrated on the marginal 6% of the market. Now in terms of the distribution of employment across the market structure one of the interesting things that accrued is that the major closures have occurred in the high capability yards. We tend to measure this by counting the employment level of 1,000 or more workers because we use this as a rough rule of thumb that says that a fully facilitized yard with shops, frames, piers and so on is generally going to end up employing about 1,000 people and that may or may not be true accross the board for all companies but it gives us a useful rule of thumb. The trend over the past ten years has been toward smaller, more specialized shipyards, the era of the large number of full service operations appears to be over. This is an important implications for naval forces that will find fewer facilities available for their repair and maintenance. I just

might point out the major closures in the past few years have been the GD Quincy facility, Lockheed Seattle and recently the Todd - LA facility. Other capable shipyards such as Bay Shipbuilding in Wisconsin and Pennsylvania Shipbuilding have renounced that they will no longer be seeking new building contracts. Now this map indicates to you those 15 shipyards that currently have Navy or Coast Guard vessel construction contracts as of September 1 this year. One of the interesting things that has occurred over the past ten years is the decline across the base there as a whole, there is something I am not sure that the DOD is fully cognizant of. We had a substantial reduction in industrial facility capability, for example: graving docks - in 1979 we had 24 of them, today we only have 14. If we focus on that population of graving docks that are greater than 500 feet in length, in 1979 we had 21, today we have only 12. In terms of ship ways we have seen a reduction from 40 to 30. Those shipways over 500 feet are 35 to 18. Floating docks 23 to 9. Floating docks over 500 feet we have 15 in 1979 and today we have only 9. Tempting to measure the overall impact in the industrial base of all these closures we even measure total pure weight and that has dropped from 109,000 feet to roughly 63,000 so in terms of aggregate measures of industrial capability, we have really lost a substantial portion of the base roughly 40% over the past ten years. When we look at backlog in the smaller yards and Navy and Coast Guard contracts what we see are what we tended to measure here in this case large steel facility for those companies that are capable of building larger vessels and having fully capitalized facility and what we are saying here in this

particular chart is that by midpoint of 1992 we are looking at the potential closure of three further facilities of the type that can be construed as the full service shipyards. Don't forget 94% of the dollar value of Navy work is in the five shipyards. The remaining ten shipyards that are currently building new construction vessels include only 3 fully facilitized yards capable of building a large merchant or naval vessels and 2 of the 3 have minimum backlog right now. Unless we have some sort of new program within the next 12 to 18 months, 4 of the yards will be out of work within one year and 7 within 2. In terms of Navy ship repair, and this gives you an idea of the number of companies that depend on the Navy ship repair workload, are a number of general points that need to be made. Some shipyards due the repairs as well as construction work that's apparent. One of the curious things though is that we are seeing a decline in commercial ship repair work as well as the decline in the Navy side. Now we would have expected in looking at the macroeconomics of the market place that with the decline of the dollar we would have expected more commercial activities in the United States and we are just not saying that. On the other side of the coin Navy ship repair is highly competitive, the profit margin is low, and the price competition tends to favor those yards that are undercapitalized. As a result we now have a situation where we watch the ship repair budget decline over time there is going to be a substantial competition that continuing over the competition in the private sector and frankly between the private sector and the naval shipyards as well. Navy planning currently, and I am not sure how much RADM Hines had

to say about this, optimizes workload at the Navy yards and private sector was required to absorb the variable workload which means we cannot have a sufficient planning exercise out there to really support the creation of a more fully facilicized shipyards. I should point out to you that as I said earlier that the Todd - LA facility is closed which means another ship repair potential facility is gone and Continental Maritime is ready, you know, San Francisco sold its drydock to a foreign shipyard due to lack of business and we don't seem very much concern the Navy department about that considering the fact that there the office of one of the most modern in the United States and was sold to a yard in Singapore and is going to operate it in the Phillipines. Last of you think that only shipyards has suffered from this decline and workload, let me point out to you that the supplier base currently can-t support mobilization requirements as well. A letter from the Secretary of the Navy to the Congress in December 1988 pointed out that suppliers can now only provide 34% of the requirement under mobilization scenarios and we expect that will continue to contract over the time. Now what we see in terms of the future, let's focus on those 5 big yards that have a relatively stable workload to look at, and what we are projecting is that on the basis of the best case scenario there will be a 12-15% reduction in the workload at the five bigger shipyards. You can tell at looking at this particular chart the dotted line represents those new orders that will be placed if the current 5-year plan is fully funded by the Congress. I should point out that there is already indications that the FY 1990 shipbuilding budget is likely to be reduced by 426 million dollars if we

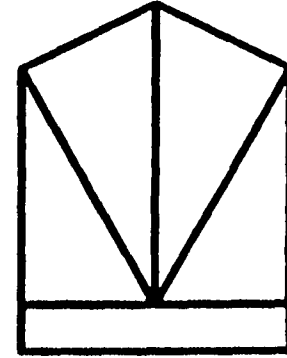
miss our deficit targets for FY 1990 and that's already been announced by OMB. The solid line indicates the current workload as it's delivered over the next five years. Obviously we will end up with some kind of line in between the best case and the worse case scenario. Our belief is that we can expect to see a **25-%** reduction in the workload of the five larger shipyards. so even in the case of the five larger shipyards, we are not seeing a fully stable situation. Frankly we are careful that by the end of 1990 we can expect to see a 10% reduction of the workforce at the shipyards. Let me talk to you for a moment" about the 301 trade petition. I am not sure how much you were able to follow this particular issue but on June 8 of this year we filed trade complaint with the Office of Special Trade Representative on the half of the U.S. industry. We targeted 4 countries: Japan, South Korea, West Germany and Norway. What we alleged in our petition was that these countries were given subsidies in government support to their Industries in a period of time when all support programs have been terminated in 1981 and that made it impossible for us to begin planning for reentry in the commercial market. Our goal is to obtain a complete cessation of your direct subsidies, not only by these countries but by other countries as well including Spain and Italy, to name the two. We have been very gratified because on July 21 of this year Carla Hills as some of you may know is the U.S. Trade Representative agreed that she would adopt a strategy that they would do everything that they could to remove subsidies from the International shipbuilding market. We agreed on a temporary basis to withdraw our petition and we have until March 31, 1990,

to try to negotiate those practices away. In fact she is on a trip to Europe right now where she is making a major effort on this subject. Depending on her degree of success we will consider in March of next year on how to proceed and I can tell you that as far as we are concerned we are getting very effective for the first time in 8 years we are getting very effective interagency support for the shipbuilding industry at least in this regard. We still have our problems with OMB and I am going to get to that in a minute. The reason we filed that petition is that we believe that a prerequisite to the development of any commercial program for the 1990's is going to require that other countries reduce or roll back their practices otherwise budgetary impact in the United States is going to be too great. Let me talk to you for a moment about the shipyard recovery program and then I will wrap up my comments. This is a plan we presented to the Congress last year which really focuses on trying to make this industry in the long run competitive and we believe we are looking at a relatively long term effort 5-10 years at a minimum. We think we need to begin telling the politicians that we want to make an effort to try to reduce their cost, to improve our productivity in our facilities, and do it in a way that calls on industry, government and labor cooperating in that exercise. We talked about, for example, the burden sharing of the productivity improvement program between industry and labor and we have been talking to the AFLCIO about that. It is a widespread agreement in the labor unions that something like this needs to be attempted. There needs to be funding for new ship design and research. The United States spent last year less than a million

dollars in commercial ship design and research, in fact it was \$500,000 dollars. I can tell you that after talking to our colleagues in Japan and Germany. They have a very effective program. Their spending hundreds of millions of dollars a year in research and development on everything from high speed ships of the future down to improving reliability and maintainability liability of commercial power plants and we cannot hope to try to re-enter the market place without having similar effort or attempted effort on the part of the United States government. We found that in general there has been widespread agreement on this particular subject except in the Office of Management and Budget. Obviously we need a reaffirmation of the Jones Act which is the domestic commercial market for U.S. operators and shipbuilders because that is the only commercial market that we see. In addition to that we talk about an assured market to encourage the investment to gain competitive position. We are really talking about using the sealift programs under the DOD to achieve that and we have several ideas here: fast sealift ships and sealift tankers are two, and I can report to you that in the House of Appropriations Committee has put in a billion dollars in next years budget to initiate this program. We donut believe we are going to come out of this congressional process with a billion dollars. My understanding is that we will probably end up with about 600 or 700 millions dollars to start the new program. We are pretty pleased with that. Couple of other efforts we are looking at are current charter program, we will build vessels for eventual charter by private operators, construction cost to be underwritten by the Federal government. Primarily in the area of defense sealift purposes. And also under Federal cargo when

we are talking about theirs is increasing level of cargos that are paid for by the U. S. taxpayers moving on a U.S. flag vessels. Just to give you an idea of what we were talking about in terms of productivity and improvement management and labor burden sharing. One of the things, in which the NSRP in general could give us some great assistance is really identifying how much more capital investment is needed in the shipyards in the U.S.. Obviously we want to encourage that capital investment but I think sometimes we overplay the argument that the U.S. shipyards by comparison to yards in Asia or Europe tend to be antiquated or don't understand the importance of capital planned investment. This is a subject that we never have a good handle on and we would turn to you all to help us with that. In addition, in terms of improving production methodologies computer processes and improved reproduction planning and engineering. We all understand I think that those are all essentials for future programs. There is a question as to how much we actually integrated particularly from the Japanese experience, a number of yards had IHI and to take that experience on. There is a question as how widespread is the adoption of those practices. Once you adopt methodologies, does that necessarily solve all your problems. I think the answer to that is no. Obviously we would need greater training. We would like to see the restarting of the apprentice program and no one is going to do that unless there was some work out there to take that on. We have asked the NFLCIO to study these questions of the productivity wage index, relaxation of work rules. Obviously most selective bargaining have no strike clauses but trying to strengthen those no strike clauses during a period that collective bargaining agreement that

we would need something on the order of labor management or productivity issues. That-s sounds a little like Yugoslavia experience in workers council and I am not sure that's as far as we would like **to go**. In terms over a long term objectives what we would like to do is to see in places the highly efficient and competitive industry by 1997 that in terms of using this sealift programs to try to serve as the engine for change in the shipbuilding industry that obviously programmed that continuity would be tied to our ability to achieve targets and productivity improvement and what we are trying to do is to stabilize the industry at the present capacity. We are not seeing into Increase capacity and that is a subject, of course, that worries some of the foreign government's we talked about. It would appear to use by the way and I have not said very much about this but that the international market is going to go through a period of highly increased demand. We expect that the production of commercial vessels will double by 1995 so there should be a role for the U.S. shipyards. In terms of the NSRP itself, obviously the goal is to reduce production costs and accelerate deliveries to improve shipbuilding methods. We believe the return on investment is at least 20 to 1. This is very difficult to explain the decision makers either in DOD or the Congress. We find that every time someone proposes spending the money on technology improvement programs that tends to get cut, first. For all practical purposes MARAD has completely dropped out of the NSRP program and it is now a Navy generated. As far as I am concerned that is a very dangerous trend because we should not be relying on the Navy department for the generation of our ideas about the commercial **sector**.



Shipbuilders Council of America

**John J. Stocker
President**

SHIPBUILDERS COUNCIL OF AMERICA

OVERVIEW

- **Founded 1920**
- **The National Trade Association
for the Ship Construction, Ship
Repair and Marine Equipment and
Service Industries**
- **Representing**
 - **26 Shipbuilders/Ship Repair Firms**
 - **18 Allied Industries Members**
 - **3 Naval Architecture Firms**
 - **95% Current U.S. Shipyard Workers**

TOPICS

STATUS OF SHIPBUILDING AND SHIP REPAIR

SECTION 301 PETITION

SHIPYARD RECOVERY PLAN

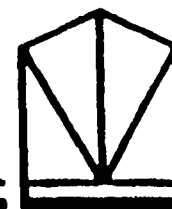
NATIONAL SHIPBUILDING RESEARCH PROJECT

ROLE OF INDUSTRIAL ENGINEERING

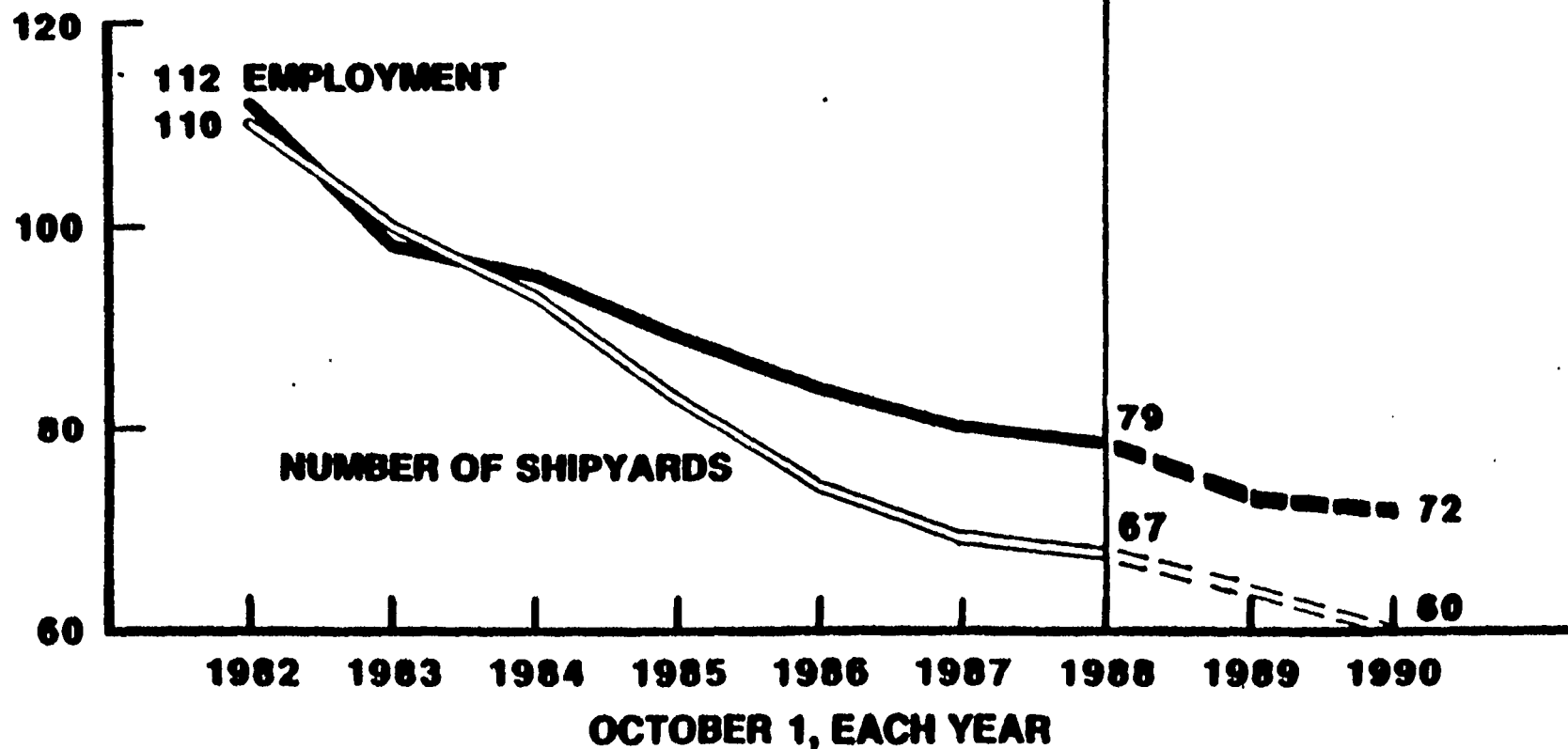
INDUSTRIAL BASE SHRINKING

- o NUMBER OF DOD MANUFACTURERS DECLINED FROM 118.489 IN 1982 TO 38.007 IN 1987.**
- o 1984 NAVY/MARAD SHIPYARD MOBILIZATION BASE ANALYSIS (SYMBA) STUDY FOUND THAT 110 PRIVATE SECTOR SHIYARDS PROVIDED "MARGINALLY ADEQUATE" MOBILIZATION BASE. STUDY BASED ON OCTOBER 1, 1982 DATA.**
- o 43 OF ORIGINAL 110 YARDS CLOSED) AS OF OCTOBER 1, 1988. OVER 33,000 PRODUCTION WORKERS HAVE LEFT THE WORKFORCE.**

PRIVATE U.S. SHIPYARD BASE



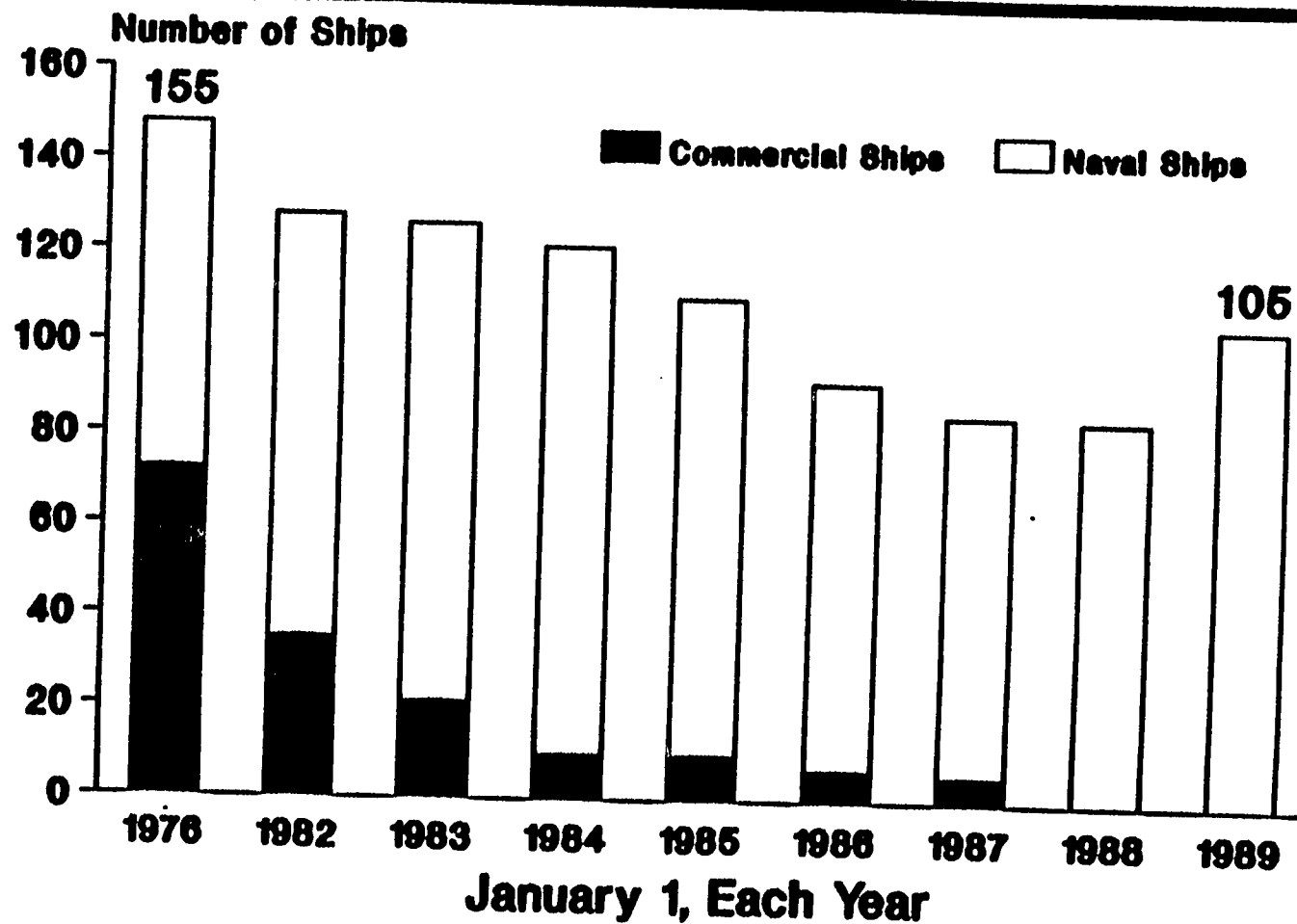
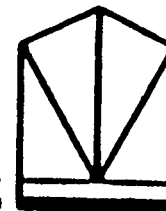
NUMBER OF SHIPYARDS OR
THOUSANDS OF PRODUCTION WORKERS



TWO MAJOR CONTRIBUTING FACTORS TO DECLINE

- 0 COLLAPSE OF COMMERCIAL SHIPBUILDING AND SHIP REPAIR MARKETS.
- 0 CONCENTRATION OF NAVY SHIPBUILDING IN FEWER SHIPYARDS.
- 0 THROUGH 1980, SHIPBUILDING BACKLOG WAS ROUGHLY HALF NAVY, HALF COMMERCIAL
- 0 DECLINE BEGAN IN 1981 WHEN FIRST REAGAN ADMINISTRATION STOPPED FUNDING FOR CONSTRUCTION DIFFERENTIAL SUBSIDIES FOR U.S. FLAG MERCHANT MARINE SHIPS.
- 0 LAST MERCHANT SHIP UNDER CONSTRUCTION IN U.S. DELIVERED NOVEMBER. 1987.
- 0 LARGE INCREASE IN CY 1989 CAUSED BY LATE AWARD OF 16 SHIPS FROM 1987 AND 1988.
- 0 JANUARY BACKLOG INCLUDES 80 MAJOR COMBATANTS, AMPHIBIOUS AND AUXILIARY SHIPS AND 25 SMALLER MINESWEEPERS, OCEANOGRAPHIC. RESEARCH AND COAST GUARD SHIPS.

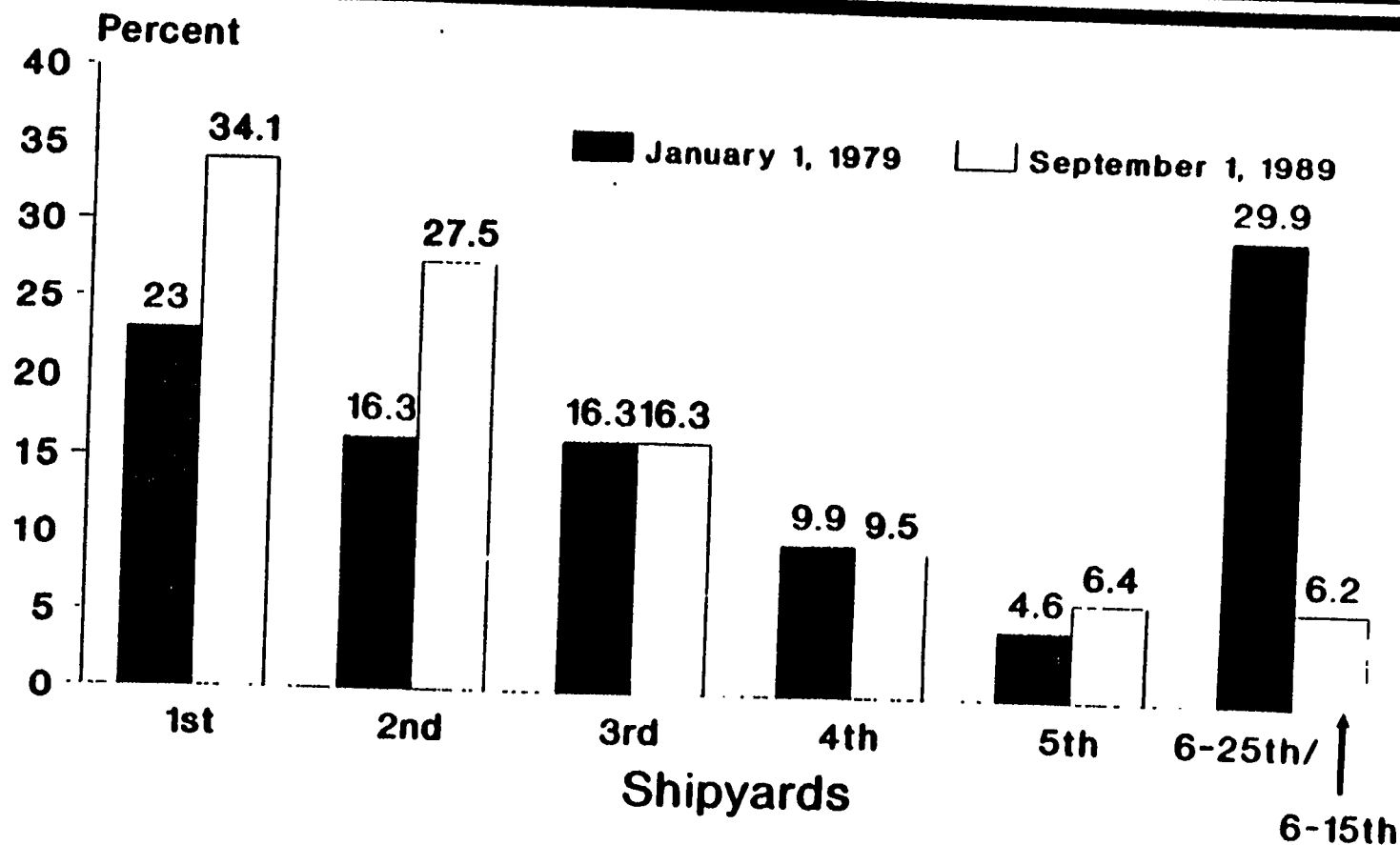
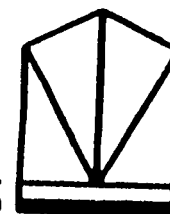
U.S. SHIPBUILDING ORDERBOOK



CONCENTRATION OF NAVY SHIPBUILDING

- o TEN YEARS AGO, 25 YARDS WERE BUILDING NAVY AND/OR COMMERCIAL SHIPS.
- o FIVE LARGEST YARDS HAD 70.12 SHARE OF MARKET.
- o ONLY 16 YARDS STILL INVOLVED IN JANUARY 1989. ONLY 15 TODAY.
- o MARKET SHARE OF FIVE LARGEST YARDS IS ALMOST 94%.

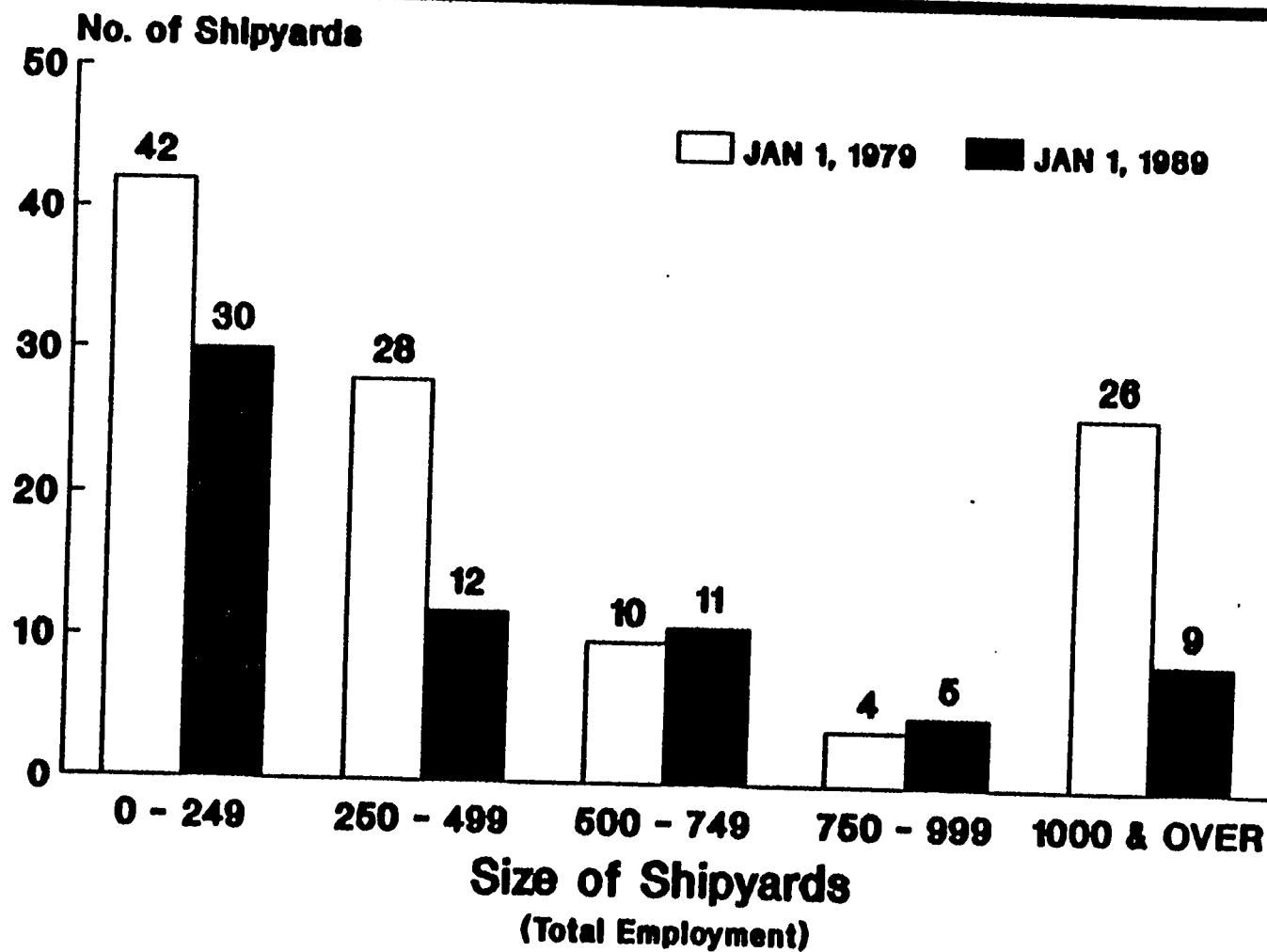
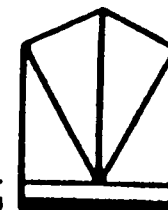
Distribution of Shipbuilding Dollars to Shipyards By Percent of Total Contract Value



MAJOR LOSSES HAVE OCCURRED AT HIGH CAPABILITY YARDS

- 0 EMPLOYMENT OF 1000 OR MORE WORKERS IMPLIES A FULLY FACILITIZED YARD WITH *SHOPS*, DOCKS. CRANES, PIERS TO BUILD OR REPAIR LARGE NAVAL OR COMMERCIAL SHIPS.
- 0 TREND OVER PAST TEN YEARS IS TOWARD SMALLER MORE SPECIALIZED YARDS. THE ERA OF A LARGE NUMBER OF FULL SERVICE SHIPYARDS APPEARS TO BE OVER. THIS HAS IMPORTANT IMPLICATIONS FOR NAVAL FORCES THAT WILL FIND FEWER FACILITIES AVAILABLE FOR THEIR REPAIR AND MAINTENANCE .
- 0 MAJOR CLOSURES IN RECENT YEARS ARE GENERAL DYNAMICS QUINCY . LOCKHEED SEATTLE AND *TODD* SAN PEDRO, CA. OTHER CAPABLE YARDS SUCH AS BAY SHIPBUILDING OF WISCONSIN AND PENNSYLVANIA SHIPBUILDING HAVE ANNOUNCED THAT THEY WILL NO LONGER SEEK NEW BUILDING CONTRACTS.

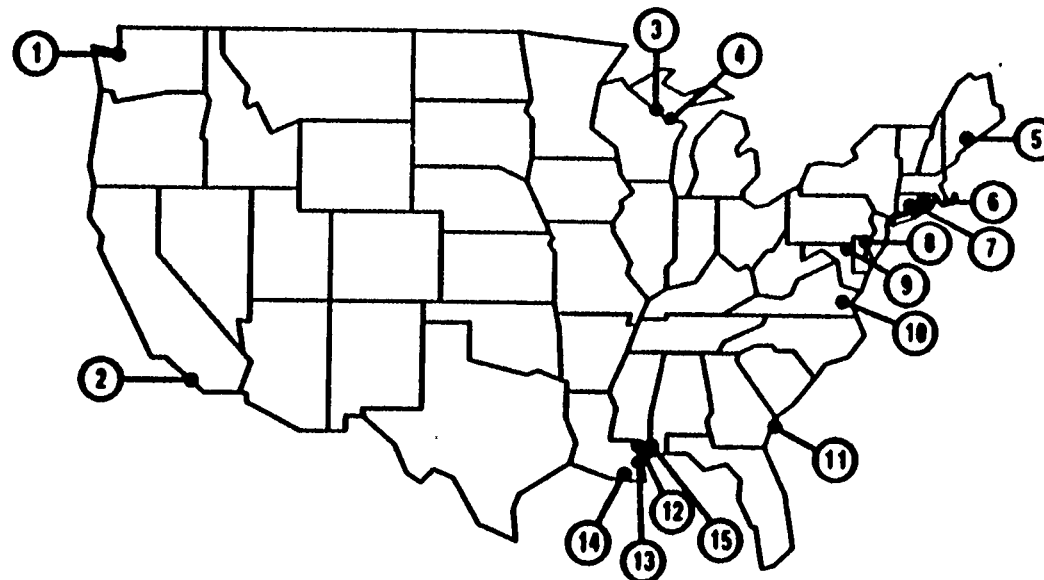
EMPLOYMENT DISTRIBUTION U.S. PRIVATE SHIPYARD BASE



**FACILITIES FOR SHIPYARDS WITH NEW CONSTRUCTION CONTRACTS
1979 vs 1989**

	1979	1989
	<u>25 YARDS</u>	<u>15 YARDS</u>
GRAVING DOCKS	24	14
GRAVING DOCKS (OVER 500 FEET)	21	12
SHIPWAYS	40	30
SHIPWAYS (OVER 500 FEET)	35	18
FLOATING DRYDOCKS	23	9
FLOATING DRYDOCKS (OVER 500 FEET)	15	9
TOTAL PIER LENGTH (IN FEET)	109.554	62.560

YARDS WITH NAVY / COAST GUARD SHIP CONSTRUCTION CONTRACTS SEPTEMBER 1, 1989

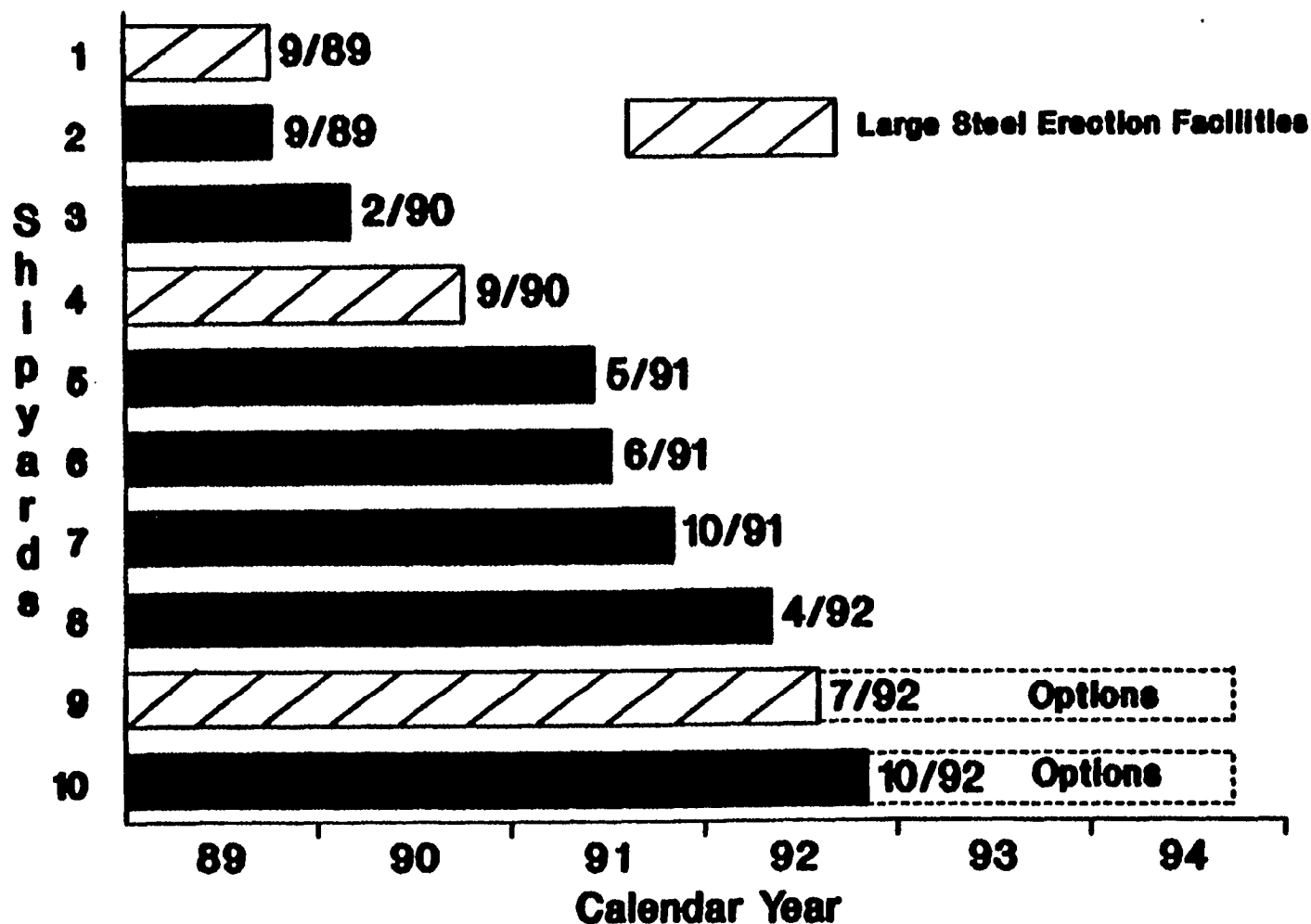


- | | |
|----------------------|--------------------------|
| 1. Tacoma Boat | 9. Beth, Sparrows Point |
| 2. National Steel | 10. Newport News |
| 3. Marquette Marine | 11. Intermarine, USA |
| 4. Peterson | 12. Ingalls Shipbuilding |
| 5. Bath Iron Works | 13. Avondale Shipyards |
| 6. R.E. Drecktor | 14. McDermott |
| 7. GD, Electric Boat | 15. Halter Marine |
| 8. Penn Ship | |

- ° WITH 94% OF DOLLAR VALUE OF NAVY WORK IN FIVE SHIPYARDS.
- o THE REMAINING TEN YARDS INCLUDE ONLY THREE FULLY FACILITIZED YARDS CAPABLE OF BUILDING LARGE MERCHANT OR NAVAL SHIPS. TWO OF THREE HAVE MINIMUM BACKLOG.
- o UNLESS NEW PROGRAMS EMERGE. FOUR OF THE YARDS WILL BE OUT OF WORK WITHIN ONE YEAR AND) SEVEN WITHIN TWO YEARS.

Navy/Coast Guard Backlog in Smaller Yards

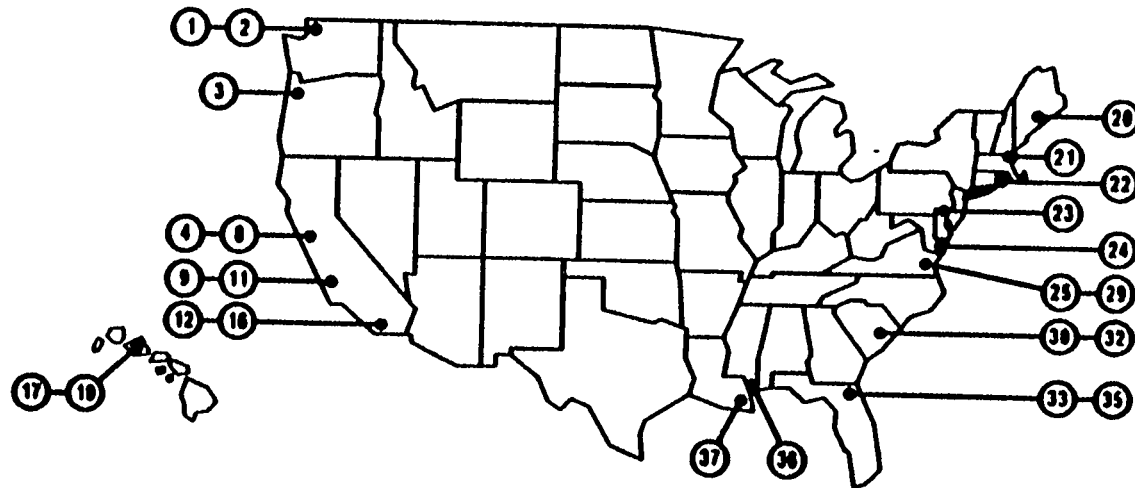
(End of Bar Represents Delivery of Last Ship Under Contract)



NAVY SHIP REPAIR

- 0 SOME SHIPYARDS DO REPAIR AS WELL AS NEW CONSTRUCTION.**
- 0 COMMERCIAL REPAIR WORK CONTINUES TO DECLINE.**
- 0 NAVY SHIP REPAIR HIGHLY COMPETITIVE MARKET PLACE.
PROFIT MARGIN LOW
PRICE ONLY COMPETITION FAVORS UNDER CAPITALIZED YARDS**
- 0 PRIVATE SECTOR AND NAVAL SHIPYARDS BOTH NEED STABLE WORKLOAD**
- 0 NAVY PLANNING OPTIMIZES WORKLOAD AT NAVY YARDS.
PRIVATE SECTOR REQUIRED TO ABSORB VARIABLE WORKLOAD PROBLEM.**
- 0 SINCE JANUARY. TODD SAN PEDRO YARD HAS CLOSED AND CONTINENTAL MARITIME SAN FRANCISCO
HAS SOLD ITS LARGE MODERN DRYDOCK TO A FOREIGN YARD DUE TO A LACK OF BUSINESS.**

PRIVATE SHIPYARDS HOLDING CONTRACTS FOR NAVY OVERHAULS AND MAJOR REPAIR AVAILABILITIES JANUARY 1, 1989



1. Todd, Seattle
2. Lake Union Drydock
3. Northwest Marine
4. Continental Maritime, SF
5. Service Engineering
6. Southwest Marine, SF
7. Bay City Marine
8. Pacific Drydock
9. Al Larson Boat Shop
10. Southwest Marine, SP
11. Todd, San Pedro
12. Pacific Ship Repair

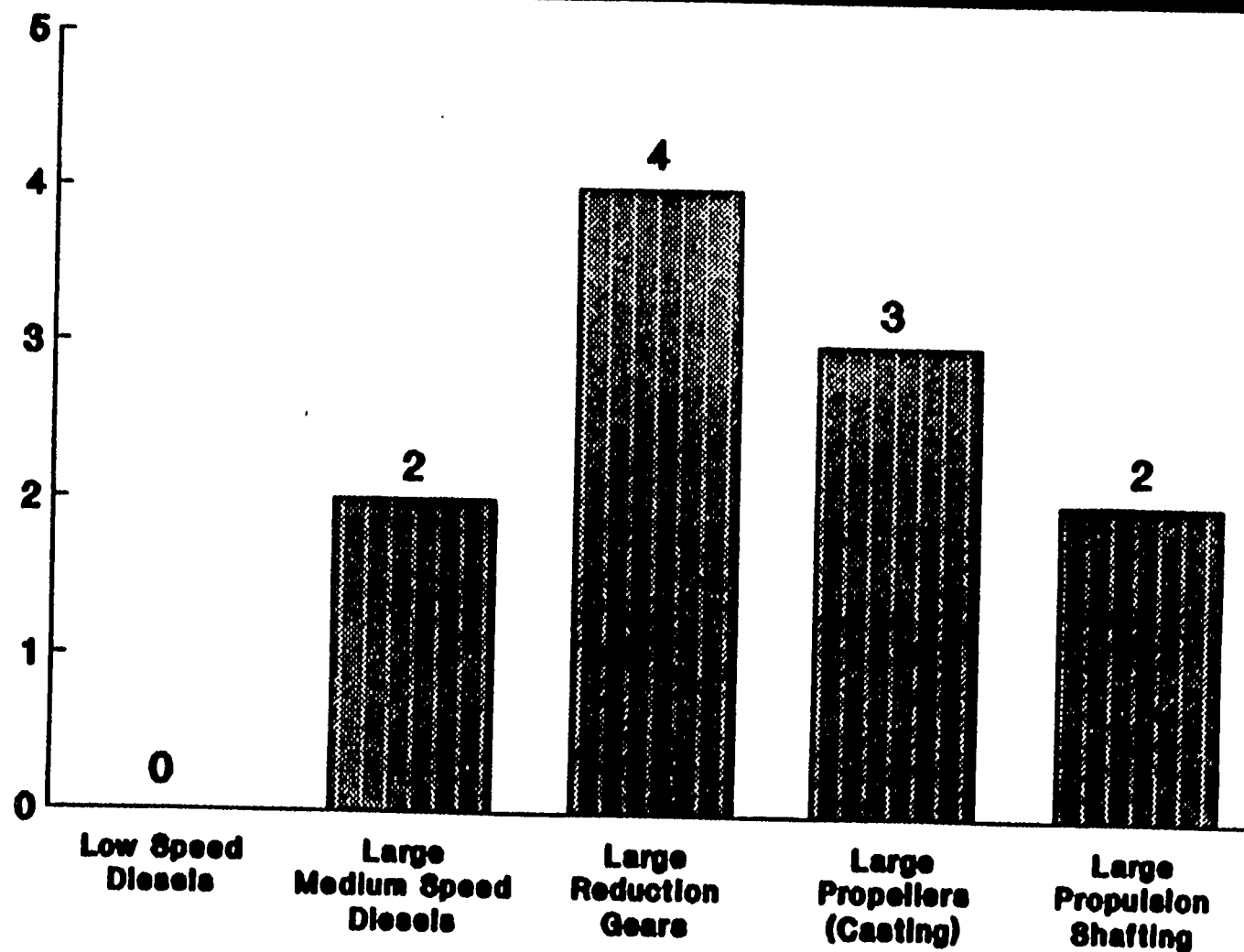
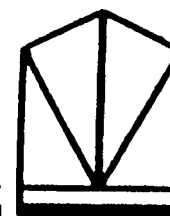
13. Continental Maritime, SD
14. A & E Industries
15. Southwest Marine, SD
16. National Steel
17. Honolulu Shipyard
18. Keehl Marine
19. Marisco Limited
20. Bath Iron Works
21. General Ship
22. R. E. Derecktor
23. Penn Ship
24. Bethlehem Steel S.P.
25. Jonathan Corporation

26. Norfolk Shipbuilding
27. Metro Machine
28. Moon Engineering
29. Colonna's Shipyard
30. Detyens Shipyards
31. Metal Trades
32. Braswell
33. Atlantic Marine
34. Jacksonville
35. North Florida
36. Ingalls Shipbuilding
37. Avondale Industries

SUPPLIER BASE CANNOT SUPPORT MOBILIZATION

- 0 SECNAV LETTER TO CONGRESS OF DECEMBER 13, 1988 STATES THAT SUPPLIER BASE CAN PROVIDE EQUIPMENT NEEDED FOR ONLY 39% OF REQUIRED NEW CONSTRUCTION OF NAVAL AND MERCHANT SHIPS IN EVENT OF PROTRACTED MOBILIZATION.
- 0 SUPPLIER BASE CONTINUES TO CONTRACT.

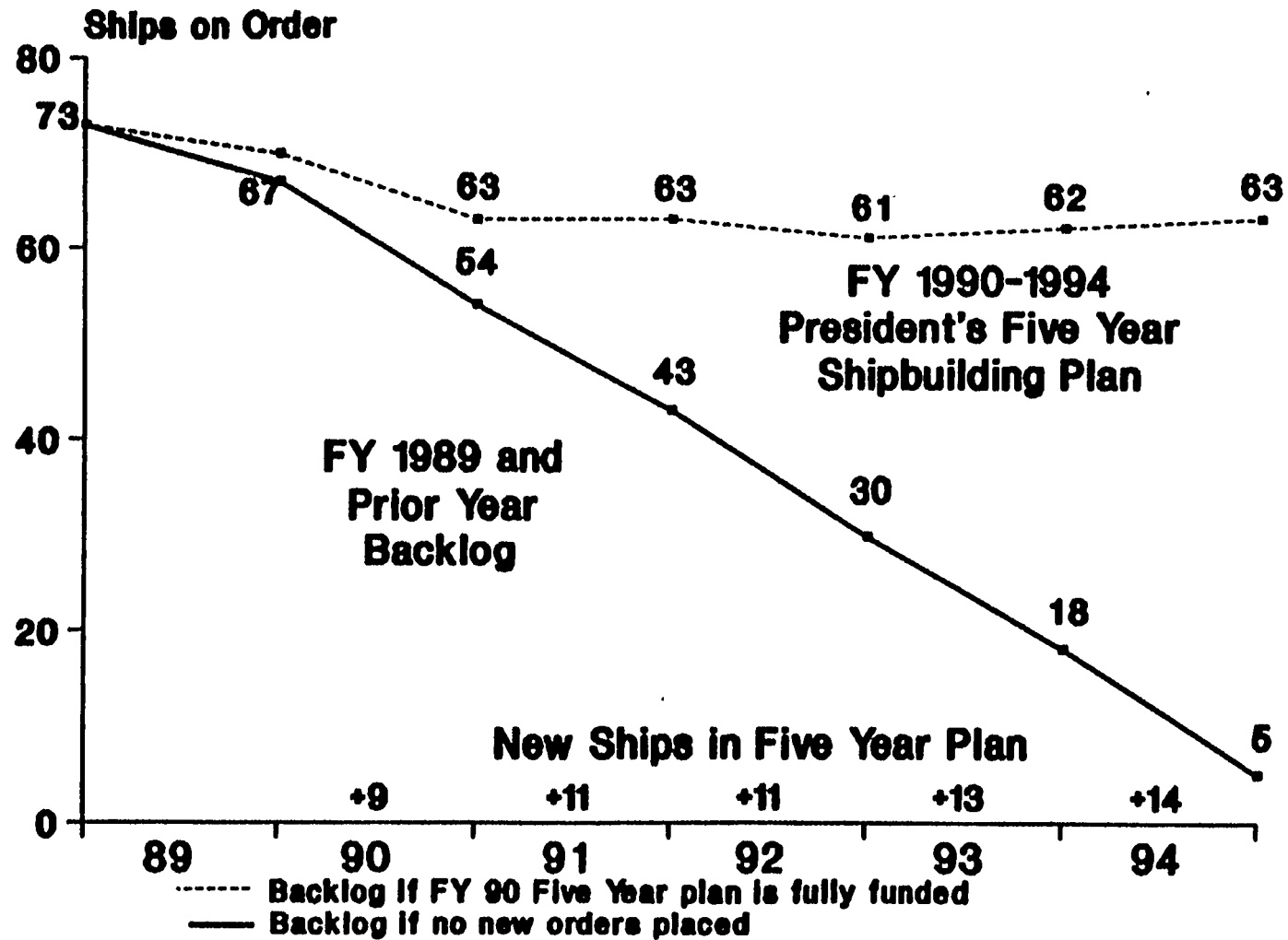
U.S. Sources of Supply for Major Ship Outfitting Items



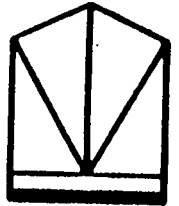
FIVE LARGEST YARDS

- o BEST CASE WORKLOAD WILL CAUSE 12-15% REDUCTION OVER FIVE YEAR PERIOD
- o IF DOD FUNDING DOES NOT EXPERIENCE ADEQUATE REAL GROWTH. THERE IS A LIKELIHOOD) THAT THE NAVY SHIPBUILDING APPROPRIATION WILL BE REDUCED. EVEN IF AN AVERAGE OF OF TEN SHIPS A YEAR IS FUNDED FOR THESE YARDS, THERE WILL BE A 25% DECREASE IN THEIR WORKLOAD BY 1994.

Projected Navy New Construction Base In the Five Largest Yards



SECTION 301 TRADE PETITION



In 1981, the United States unilaterally ceased all subsidies to its shipbuilders

SCA filed petition on June 8, 1989 in accordance with Section 301 of the Trade Act of 1974 as amended

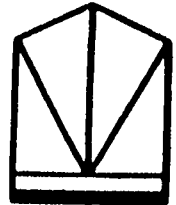
Petition targets unfair trade practices in shipbuilding and ship repair by Japan, South Korea, West Germany and Norway

Goal is to obtain cessation of direct and indirect subsidies by targeted countries

On July 21, 1989 U.S. Trade Representative Carla A. Hills announced a “strategy to restore a competitive world market for the shipbuilding industry by curbing foreign government subsidies.”

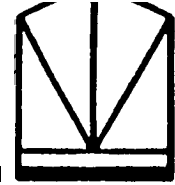
- **Based on these efforts, SCA agreed to withhold 301 petition**
- **U.S. Trade Representative is seeking multilateral agreements with targeted countries to discipline shipbuilding subsidies**
- **U.S. Department of State is concurrently working through the organization of Economic Cooperation and Development (OECD) to obtain agreements to end subsidy practices**
- **Progress will be reviewed on March 31, 1990. If insufficient movement achieved, SCA may resubmit the petition and proceed to dispute settlement under the GATT Subsidies Code**

NATIONAL SHIPYARD RECOVERY PROGRAM FOR THE 1990s



- **JOINT INDUSTRY/LABOR/GOVERNMENT PROGRAM
TO ENHANCE PRODUCTIVITY/REDUCE COSTS IN
A LIMITED NUMBER OF YARDS TO SUSTAIN
COMMERCIAL SHIPBUILDING CAPABILITY AND
PRESERVE THE MOBILIZATION BASE**
 - **PRODUCTIVITY IMPROVEMENT BURDEN SHARING-
INDUSTRY/LABOR**
 - **SHIP DESIGN/RESEARCH FUNDING**
 - **JONES ACT REAFFIRMED**
 - **ASSURED MARKET TO ENCOURAGE NECESSARY
INVESTMENT TO GAIN COMPETITIVENESS**
 - **FAST SEALIFT SHIPS**
 - **SEALIFT TANKERS**
 - **FEDERAL CARGO**
 - **PROCURE AND CHARTER**
 - **FEDERAL SHIP PROCUREMENT**

PRODUCTIVITY IMPROVEMENT - MANAGEMENT/LABOR BURDEN SHARING



**CAPITAL INVESTMENT IN SHIPYARDS NEEDS TO BE
ENCOURAGED RATHER THAN DISCOURAGED**

**● CORPORATE INVESTMENT IN PLANT FACILITIES AND
EQUIPMENT**

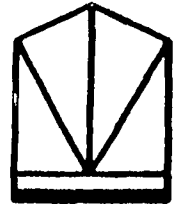
O MANAGEMENT COMMITMENT TO:
- IMPROVED PRODUCTION METHODOLOGY
- COMPUTER AIDED PROCESSES
- IMPROVED PRE PRODUCTION PLANNING/ENGINEERING

O APPRENTICE PROGRAM/LABOR TRAINING/CROSS TRAINING

O LABOR COMMITMENT TO:
- PRODUCTIVITY WAGE INDEX
- RELAXATION OF WORK RULES
- NO STRIKE CLAUSE

O LABOR/MANAGEMENT FORUM FOR PRODUCTIVITY ISSUES

LONG TERM OBJECTIVES



- **A MODERN, HIGHLY EFFICIENT AND COMPETITIVE COMMERCIAL SHIPBUILDING INDUSTRY IN PLACE BY FISCAL YEAR 1997**
- **PROGRAM CONTINUITY TIED TO PRODUCTIVITY ACHIEVEMENT**
- **STABILIZE THE INDUSTRY AT ITS PRESENT CAPABILITY, NOT CREATE NEW CAPACITY**

NSRP

- 0 **GOAL: TO REDUCE PRODUCTION COSTS AND TO ACCELERATE DELIVERIES**
THROUGH IMPROVED SHIPBUILDING METHODS.
- 0 **EXISTENCE BASED ON MERCHANT MARINE ACT OF 1936.**
- 0 **RETURN ON INVESTMENT IS AT LEAST 20 TO 1.**
- 0 **FUNDING DECREASING AND TOTALLY DEPENDENT ON NAVY AND INDUSTRY. MARAD**
HAS DROPPED OUT OF PROGRAM.
- 0 **HOUSE MERCHANT MARINE COMMITTEE ADDED \$2.25 MILLION IN MARAD**
AUTHORIZATION BILL FOR FY 1990 R&D. INCLUDES \$.5 MILLION FOR NSRP AND
\$1.75 MILLION FOR INDUSTRIAL AND PRODUCTIVITY RESEARCH. OMB OPPOSES.
- 0 **COUNCIL SEES NSRP AS VEHICLE TO SUPPORT SHIPYARD RECOVERY PLAN.**

INDUSTRIAL ENGINEERING ROLES

- 0 SAME AS NSRP GOALS:
 - REDUCE COSTS.
 - ACCELERATE DELIVERIES.
- 0 INDUSTRY SURVIVAL DEPENDS ON BECOMING COMPETITIVE.
- 0 IMPROVED PRODUCTIVITY THROUGH PLANT REINVESTMENT.
 - WHAT IS NEEDED?
 - NO FRILLS, CORE REQUIREMENTS ONLY.
- 0 MACRO OVERVIEW OF INDUSTRIAL ENGINEERING REQUIREMENTS .
 - EACH INITIATIVE MUST BE INTEGRATED INTO MASTER PLAN.

Problems of the Shipbuilding Industry .

By: Zbigniew Karaszewski

Gary Higgins asked me to get myself in trouble today by sharing some of my beliefs with you.

I should start by saying that U.S. industrialization effort must be in marketing of new frontiers where boundless system vise component oriented approach must prevail. We want to talk about imperative roll of processes and their indisputable impact on the outcome of the end result, a second to none ship. We can not allow ourselves to be disillusioned by the WW II successes of mass produced cheap goods, outmoded capabilities of the American spirit, and questionable know-how. We must compare ourselves (the islanders) with the mainland of world's remainder through conscious assessment of our weaknesses:

continuing neglect of human resources;
mostly outdated strategies;
acute failures of cooperation;
prevailing technological weaknesses in development and productivity;
government and industry working at cross purposes; and,
comfort of short time horizons.

We want to hail our critics and punish patronizing, condemn selfishness and reward consciousness.

Our strategy should flow out of our weaknesses.

We Americans invente the wheel. They the World are changing its shape, when we Americans are polishing its RIM (Ready If Must).

We too often support a concept of a professional that is no more than 30 years old and has 50 years of experience with special consideration for those that have a minimum of 5 years experience in each of the following: OS2, UNIX, VMS, MSDOS, CDC, ABC operations. We often ridicule human capacity to succeed!

Our parochial attitudes are measured by the use of definite boundaries of an old and comfortable "known," and rock no boat concepts. The "Don't fix it if it is not broken" theme is a super concept but frequently misunderstood.

We want to be functionally superior. Becoming professionally functional is a result of continuous refinement of processes to suit changing demands of the customers. You want 'to anticipate those demands in a "global" market sense. Do not be parochial, 'Vreachout and touch the world," think big, find where the beef is.

Yours or your company's success is in the human resource. If You do not see it I suggest you go fishing.

Recognize immediate problems of the industry:

No ships being built.

No ships being repaired.

No strategy to get well

-Do repair and newbuildings as well, do not discriminate between jobs, clean up your yard.

-Revise the past, and concentrate on immediate needs, think of the future! You do not need American standard for NOW, but you need American shipbuilding strong NOW. Hell with Product standards! They are too easy to develop and the rest of the world makes them now better anyway. Do not re-invent the wheel. Adopt what's best from wherever you can, but do not overdue it! If USSR have good standards use them - for now!

Let's CONCENTRATE our effort entirely on the following:

- 1) Cultivating BUSINESS SYSTEM CULTURE (People, processes, machines, markets, strategies).
- 2) Establishing TECHNICAL COOPERATION (your proprietary information is most likely outdated in a global sense) with other shipyards.
- 3) Promoting TECHNOLOGY. Also revisit old ideas (globally), because remember, what was not good for them then might be good for you today.
- 4) Academic PROMOTION - practice with theory. "Revise" TEACHERS. Target PRIMARY and SECONDARY SCHOOLS, and COLLEGES - Teach thinking, revise curriculums to stress basics in the context of oriented approach. Counsel Engineering Schools accreditation. Teach system Engineering.

People abilities + technics + tools = capabilities.

In several studies concerned with the future of our industrial base it has been sighted that there are still worrisome weaknesses affecting U.S. industrial performance. They are:

continuing neglect of human resources;
mostly outdated strategies;
acute failures of cooperation;
prevailing technological weaknesses in development and productivity;
government and industry working at cross purposes; and,
comfort of short term horizons.

The above have been related mostly to the industries that still prosper to some degree and shipbuilding is not being one of them of course.

I should say that our strategy of new shipbuilding policy should flow out of these weaknesses.

In tomorrows global market our shipbuilding industry must become more productive through continuous refinement of Processes to suit changing demands of the customers.

The current picture of the United States marine industry embodies its ship design and construction, equipment Supply and operational components into a grim perception of a sinking boat.

With fewer traditional sources of business available, dwindling profit margins, limited motor ship design experience and competition from abroad the mainstream American naval architecture is on the course of extinction. Our everlasting loyalty to marine steam propulsion for example have cause an almost deliberate technological isolation from other economically sound concepts like diesel power application.

The American shipbuilding industry, although considered as one of the largest in the world, supplies only a small fraction of world's ships and is considered by large to be uncompetitive and inefficient in ship construction and repair.

The quality, cost and availability of marine material and components has affected productivity and competitiveness of U.S. shipbuilders and ship operators. Influenced by production costs alone suppliers are providing shipyards and shipboard personnel with significant portion of spare parts that do not work.

It is no secret that American competition diluted by the elements of market protectionism and government dependency have resulted in erosion of competent marine designers, qualified shipyards, quality supplier base and successful shipping.

In overall our emphasis on leveling of priorities vice achieving their vertical balance have resulted in distorted perception of our goals. From that the resultant actions allowed for the systematic and unchecked deterioration of our competitive edge. Technological isolation, and depletion of traditional feeding grounds and sources of sustenance, and market inability to sudden "retooling" have precluded the current state of U.S. marine industry.

Although the industry is going through its worst period in decades we still have to move our cargos and maintain our naval presence in the world.

I like to address now each previously identified industrial weakness separately.

OUTDATED STRATEGIES

Parochialism is our enemy. American firms found a seemingly unlimited and uncontested outlet for their products in their own domestic markets. The home market was large, unified, and familiar. America must sell abroad to pay for the goods it buys abroad and for the money it has borrowed abroad. To sell abroad

requires understanding of foreign societies that Americans do not possess.

Most damaging is the assumption that American tastes, American ways of doing business, and American products are universal (or ought to be). Americans have not yet taken seriously the needs and preferences of other societies. The educational system from kindergarten to graduate and professional schools has reinforced the inward-looking bias and has failed to open windows onto the world.

Parochialism has also blinded Americans to the growing strength of scientific and technological innovation abroad, and the possibilities of adapting the discoveries for use in the U.S.

SHORT TIME HORIZONS (SHORT TERM MENTALITY)

The idea of long range planning is hard to conceive and difficult to justify. Its inherent complexities lie in relating predictions of operational scenarios with achievable levels of reliability coupled with indisputable real time knowledge of equipment degradation and personnel support.

Overwhelming support for short term solutions is obvious since they provide immediate and relatively easy relief of the problem with instant rewards to those that skillfully apply them.

The long term solutions, on the other hand, are not as appealing because they are more difficult to obtain, economically unsound at first or just plain risky, and most of all provide little immediate individual reward. Therefore, it is hard to motivate operational staff with long range goals and objectives without technically achievable and mutually acceptable innovative personnel management plan. Such a plan has to contain adequate and reliable means of measuring progressive contribution of personnel in achieving of their individual objectives so that the relative and verifiable rewards could be computed.

When considering current state of the marine industry and distorted equipment degradation models that are neither accurate nor realistic, our confidence in succeeding integrated multifunctional long term corporate plan is dim at best. A greater attention must be given to the absolute equilibrium of design, construction, operations, customer support and financial depreciation of equipment over its entire life.

1. Preoccupation of American business with short term results.
2. The high cost of capital pushes American companies in the direction of short term horizons. So long as U.S. firms must pay more for the use of capital, in their own self-interest they must seek quicker payoffs than their rivals. These problems stem in part from the practices of financial institutions and corporate managers and sometimes also from the risks perceived to be associated with the policies of the U.S. and other governments.

3. U.S. firms revealed a greater willingness than their European and Japanese counterparts to sacrifice the advantages of long-term relationships for the benefit of short-term gain.

TECHNOLOGICAL WEAKNESSES IN DEVELOPMENT AND PRODUCTION

1. Neglect of manufacturability and quality in product design. Lack of attention to simplifying designs (reducing part count).
2. Lack of teamwork in the product - development processes (coordination of design and manufacturing).
3. Lack of attention to the manufacturing process (process design and production operations) and its strategic importance.
4. Lack of exploitation of the potential for continuous improvement in quality and reliance of products and processes.
5. American system of engineering education has progressively deemphasized product realization and process and production engineering. Much greater emphasis were put on the fundamental principles of engineering and correspondingly less on familiarity with industrial technology. Design of manufacturing processes and production operations acquired a

reputation as lowbrow activities and largely disappeared from the curriculum with the exception of chemical engineering which in large measure is process engineering.

NEGLECT OF HUMAN RESOURCES

1. Patterns of education and training in the U.S. and in its principal economic competitions show up in differences in productivity in the firm and at the national level. Quick task related instructions versus development of general as well as specific skills.
2. Formal schooling is inadequate. American 10-year olds place 8th out of 15 industrial nations. Thirteen to seventeen-year olds place 13th out of 15 industrial nations.
3. Vocational education is not considered a viable preemployment training system because of its disappointing performance. With vocational education of limited effectiveness and few apprenticeships outside the construction trades, there is no systematic path of training for the non-college-bound. This lack of a structured transition from secondary schools to work results in weaker skills than those of European and Japanese workers. In this area, American workers and firms are at a serious disadvantage.

FAILURE OF COOPERATION

1. Cooperation within the firm is not good. There is slow or inadequate flow of information from marketing to research and development, and from the latter to production. Professionals have difficulty working in teams with specialists in other disciplines. Decisions that should be integrated are made sequentially. Tasks are subdivided by discipline and artificial boundaries are set.
2. Labor-management relations are still immersed in conflict. U.S. firms and unions continue to expend valuable resources and energies battling over union organizing and the role of labor in society. The legacy of conflict has produced an adversarial pattern of industrial relations characterized by much conflict and little trust between workers and their employers.
3. The U.S. firms are maintaining arm's-length relations with suppliers and customers which often results in missing opportunities for useful vertical interaction.
4. Interfirm cooperation in the U.S. has often been inhibited by government antitrust regulation.

GOVERNMENT AND INDUSTRY AT CROSS-PURPOSES

1. Regulatory policies have, in many cases, a serious impact on performance. Overlapping regulatory jurisdictions, complex and lengthy procedural requirements, and excessively detailed prescriptive regulations promulgated by inflexible regulatory instructions.
2. Uncertainty about the future course of regulation inhibits technological innovation and investment in R & D.
3. Technological infrastructure - public laboratories and facilities, communication links, intellectual - property laws, technical standards, and other aspects of the environment has grown haphazardly, without adequate regard for its strategic implications. It does not facilitate the rapid development and use of new technology and creates serious competitive problems for some American firms.
4. Within national defense there is substantial opportunity to improve the efficiency with which goods and services are produced by the DOD. There are serious indirect costs of defense spending arising from the inappropriate transfer of defense R & D or procurement practices to civilian industry, such as applying stringent military specifications and production standards to civilian processes and products that do not require military performance.

5. The indirect benefits and costs of the military presence in the U.S. economy are intangible and are decreasing. This is happening because the U.S. no longer has the manufacturing presence to take full advantage of military spillovers; DOD in fairness to all contractors, big and small, has increased bureaucratic procedures for R & D procurement, thereby introducing greater delays in the R & D cycle; there has been a consistent tendency toward short-term, mission-oriented contracts, which tends to reduce risk but also reduce the likelihood of future commercial payoffs.

The aforementioned problems require remedies to be considered as:

POLICY RECOMMENDATIONS

- o Macroeconomic policies
 - 0 Institutional and regulatory policies
 - 0 Science and technology policies
 - 0 Capital formation
 - 0 Education and training
 - 0 Management strategies
 - 0 International economic policies
 - 0 Formulation of the Commission of Industrial Productivity

MACROECONOMIC POLICIES

Reduce the federal budget deficit and the U.S. balance-of-payments deficit and increase savings and investment through stable fiscal and monetary policies.

INSTITUTIONAL AND REGULATORY REFORMS

Reform U.S. antitrust regulations by modifying Section F of the Clayton Act and other antitrust statutes to recognize potential efficiency gains resulting from business combinations and to provide antitrust exemptions for certain types of mergers and other types of business relations that promote national objectives.

Restrict triple damage liability to cases of business behavior explicitly prohibited by law.

Department of Justice and other government agencies would meet periodically to review and recommend revisions to antitrust policy.

Repeal the Jones Act to allow for increased cargo transportation options.

Reform U.S. product liability law by adopting a fault based system of liability with limitations on recovery.

Deregulate certain industries, such as public utilities.

Develop new institutional mechanisms such as a department of Science and Technology.

Appoint a Presidential Advisor on economic competitiveness, establish an information center on international competitiveness within Department of Commerce, and create a National Commission on Industrial Competitiveness.

SCIENCE AND TECHNOLOGY POLICIES

Increase the effectiveness of technological innovation as a contributor to industrial productivity and international competitiveness.

Foster long-term research and development of innovation including higher R&D tax credit.

Protect intellectual property rights, cooperative research and development, aid to basic research, and technology transfer and commercialization.

CAPITAL FORMATION

Increase savings and investment.

Allocate capital to its most productive uses.

Increase nations fixed capital stock through investment in new plants and equipment.

EDUCATION AND TRAINING

Elementary and Secondary Education: Institute more rigorous educational standards coupled with strengthened efforts to address the drop-out problem and measures aimed at greater computer literacy.

Establish public-private partnerships to provide coordinated services in the school setting.

Place greater emphasis on meeting the needs of gifted and talented students as well as those in need of special assistance.

Federal government must assume financial burden for a "renewal of the nation-s primary and secondary education."

Establish longer school year and put greater emphasis on team effort, cooperation, and group achievements.

Provide higher pay for teachers, incentives to attract teachers in technical subjects (maths and science).

Establish investment program to rebuild the nation's educational infrastructure.

Higher Education: Place greater emphasis in areas of foreign languages, cultures, and sociopolitical institutions, and cooperative international studies of management practices.

Reemphasize manufacturing engineering and expand teaching and research in business schools On the management of research and development, technological innovation, productivity, and quality improvements.

Alleviate the faculty shortage in science and engineering educators, update the research equipment and instrumentation at universities, and address the issue of declining enrollments by American students in science, engineering, and other technical fields.

Continuous Training of Workforce: Increase emphasis on institutional and individual commitment to lifelong education. Government and corporations should provide opportunities and support for worker participating in educational programs.

Retraining Displaced Workers: Develop coherent and comprehensive national program for displaced workers modeled on the G.I. Bill.

Education of Disadvantaged Workers: Increase private sector participation at the local level in the creation of training programs and job opportunities for disadvantaged workers. Develop new innovative programs for disadvantaged workers.

MANAGEMENT STRATEGIES

Establish American world leadership in the commercialization of product and process technology to increase investment in both physical and human capital, to develop new ways of reaching and consensus on goals within companies and to broaden its vision by taking a global-view of markets and accepting the certainty of global competition.

Management and labor should forge new relationship based on trust and cooperation through new commitment to equity, consistency, and problem solving.

INTERNATIONAL ECONOMIC POLICIES

Improve trade policies and the policy making apparatus within the U.S., promoting American exports to the rest of the world, responding to "trade-distorting" policies of other countries, reforming the international trading system through the current negotiations on the General Agreement of Tariffs and Trade (GATT), coordinating international policies on currency exchange rates and macroeconomic issues, and resolving thrid-world debt problem.

In my closing remarks I would like us to think of this conference as a "global" consideration for the Process Engineering. Thank You.

PROBLEMS OF THE SHIPBUILDING INDUSTRY

NO SHIPS BEING BUILT

NO SHIPS BEING REPAIRED

NO STRATEGY TO GET WELL

ISSUES AFFECTING U.S. INDUSTRIAL PERFORMANCE

NEGLECT OF HUMAN RESOURCES

MOSTLY OUTDATED STRATEGIES

FAILURE OF COOPERATION

TECHNOLOGICAL WEAKNESSES

GOVERNMENT AND INDUSTRY

WORKING AT CROSS PURPOSES

CONFIRMATION OF SHORT TERM HORIZONS

WHO CAN WE BLAME?

INDUSTRIAL MANAGERS AND EXECUTIVES:

- FOR HOLDING STUBBORNLY TO AN OUTMODED MASS-PRODUCTION MODEL
- FOR SETTING INAPPROPRIATE FINANCIAL GOALS
- FOR RELEGATING PRODUCT REALIZATION AND PRODUCTION ENGINEERING TO SECOND-CLASS STATUS
- FOR FAILURE TO MAKE THE INVESTMENT IN PLANT, EQUIPMENT, AND SKILL NECESSARY FOR TIMELY PRODUCT DEVELOPMENT AND EFFICIENT MANUFACTURING.
- FOR BOTH PAY AND PROMOTION SCALES FAVORING DESIGN OVER PROCESS AND MANUFACTURING ENGINEERS.

THE GOVERNMENT:

- FOR BEING INDIFFERENT TO THE NEED FOR ACTIVE AND EXPLICIT PROMOTION OF RESEARCH AND TECHNOLOGY FOR ECONOMIC DEVELOPMENT.

SYSTEM OF ENGINEERING EDUCATION:

- FOR PROGRESSIVELY REEMPHASIZING PRODUCT REALIZATION AND PROCESS AND PRODUCTION ENGINEERING SINCE WWII.

STRATEGIES

- FOR INDUSTRY**
- FOR LABOR**
- FOR GOVERNMENT**

STRATEGIES FOR INDUSTRY (1)

- FOCUS ON THE PRODUCTION PROCESS, WITH THE OBJECTIVE OF IMPROVING LONG-TERM PRODUCTIVE PERFORMANCE.
- ADOPT AS AN EXPLICIT OBJECTIVE OF THE PRODUCTION PROCESS THE DELIVERY OF HIGH-QUALITY PRODUCTS TO MARKET IN A TIMELY FASHION AT COMPETITIVE PRICES.
- DEVELOP TECHNIQUES TO MEASURE AND IMPROVE THE EFFICIENCY AND QUALITY OF THE PRODUCTION PROCESS, AND IDENTIFY OPPORTUNITIES FOR PROGRESSIVE IMPROVEMENT IN ITS PERFORMANCE.
- EMPHASIZE PRODUCT VARIETY AND MANUFACTURING FLEXIBILITY IN THE DEVELOPMENT OF PRODUCTION SYSTEMS.
- CULTIVATE A MORE INVOLVED, LESS SPECIALIZED, CONTINUOUSLY LEARNING WORK FORCE.
- FLATTEN ORGANIZATIONAL HIERARCHIES TO GIVE EMPLOYEES GREATER RESPONSIBILITY AND BROADER EXPERIENCE.
- INTEGRATE AND PERFORM CONCURRENTLY THE FUNCTIONS OF R&D, PRODUCT DESIGN, AND PROCESS DESIGN TO ACHIEVE GREATER EFFICIENCY AND SHORTER TIME TO MARKET.

STRATEGIES FOR INDUSTRY(2)

- COOPERATE WITH SUPPLIERS RATHER THAN TREATING THEM AS ADVERSARIES.
- INSIST THAT KEY EMPLOYEES HAVE AN ADEQUATE UNDERSTANDING OF FOREIGN CULTURES.
- ADOPT THE BEST PRACTICES OF WORLD INDUSTRY TO IMPROVE PRODUCTIVITY AND QUALITY IN THE MANUFACTURING PROCESS.
- IN THE AREA LABOR-MANAGEMENT RELATIONS, SUPPORT DIFFUSION OF COOPERATIVE INDUSTRIAL RELATIONS BY ACCEPTING LABOR REPRESENTATIVES AS LEGITIMATE AND VALUED PARTNERS IN THE INNOVATION PROCESS.

STRATEGIES FOR LABOR

- LABOR UNION LEADERS MUST BECOME CHAMPIONS OF COOPERATIVE AND INNOVATIVE INDUSTRIAL-RELATIONS PRACTICES AND A NEW GENERATION OF LEADERS SKILLED IN USING THESE NEW PRACTICES TO PROMOTE THE LONG-RUN INTERESTS OF THEIR MEMEBERS AND THE FIRM THAT EMPLOY THEM.

STRATEGIES FOR GOVERNMENT (1)

- THE FEDERAL GOVERNMENT SHOULD PURSUE MACROECONOMIC POLICIES THAT REDUCE THE COST OF CAPITAL FOR PRIVATE INVESTMENT.
- THE FEDERAL GOVERNMENT SHOULD CONTINUE TO PRESS FOR REMOVAL OF TRADE RESTRICTIONS AND FOR EQUAL ACCESS FOR U.S. FIRMS AND PRODUCTS TO FOREIGN MARKETS.
- THE FEDERAL GOVERNMENT SHOULD ADOPT PROGRAMS FOR K-12 EDUCATION THAT WILL LEAD TO GREATER TECHNOLOGICAL LITERACY.
- THE FEDERAL GOVERNMENT SHOULD ENCOURAGE CONTINUOUS EDUCATION AND TRAINING FOR THE U.S. WORK FORCE, WITH SPECIAL ATTENTION TO THE INCREASED PARTICIPATION OF WOMEN, BLACS, AND SPANISH-SPEAKING AMERICANS.
- THE FEDERAL GOVERNMENT SHOULD ENDORSE AND SEEK TO DIFFUSE LABOR-MANAGEMENT COOPERATION AND WORKER PARTICIPATION IN BOTH UNION AND NONUNION SETTINGS.

STRATEGIES FOR GOVERNMENT (2)

- THE FEDERAL GOVERNMENT SHOULD CONTINUE INVESTING IN BASIC RESEARCH AND SHOULD PROVIDE ADEQUATE SUPPORT FOR OPERATIONS, EQUIPMENT, AND MODERN FACILITIES.
- THE FEDERAL GOVERNMENT'S SUPPORT OF R&D SHOULD BE EXTENDED TO INCLUDE A GREATER EMPHASIS ON POLICIES TO ENCOURAGE THE DOWN-STREAM PHASES OF PRODUCT AND PROCESS ENGINEERING AND TO CLEAR ANY CURRENT OBSTACLES TO INNOVATION.
- THE GOVERNMENT SHOULD ENCOURAGE THE ESTABLISHMENT OF A NATIONAL INFORMATION INFRASTRUCTURE.
- THE FEDERAL GOVERNMENT SHOULD HEED THE MANY VOICES CALLING FOR GREATER EFFICIENCY IN MILITARY R&D AND MILITARY PROCUREMENT TO MINIMIZE THE FINANCIAL AND HUMAN RESOURCES REQUIRED TO MEET NATIONAL SECURITY NEEDS.

**WE AMERICANS INVENTED THE WHEEL OF INDUSTRIAL SUCCESS
THEY, THE WORLD ARE CHANGING ITS SHAPE,
WHEN WE AMERICANS ARE POLISHING ITS OLD R.I.M.
(Ready If Must).**

SUCCESS FORMULA

PEOPLE ABILITIES + TECHNIQUE + TOOLS = CAPABILITIES

SP-8 MEETING
11 SEPTEMBER 1989

<u>NAME</u>	<u>ORGANIZATION</u>	<u>PHONE</u>
Kurt Doehnert	NAVSEA 07011	(202) 746-4477
Lou Smith	Long Beach NSY	(213) 547-6329
Zbigniew Karaszewski	MARAD MAR-700	(202) 366-5841
LCDR Michael Bosworth	DTRC Code 1222	(301) 227-3553
John Jessup	Peterson Builders Inc.	(414) 743-5574
		Ext. 381
Ronald Sharbaugh	NAVSEA 0701	(202) 746-4477
LCDR Chuck Pavlos	Pearl Harbor NSY	(808) 474-7191
Brian Jim/On	Peark Harbor NSY	(808) 471-3565
Kathy Lahey	USITC Wash. D.C.	(202) 237-3629
Jim Wilkins	Wilkins Enterprise	(301) 266-7689
Larry Brown	The Brown Network	(707) 648-0574
Rodney Robinson	R-P-M	(603) 436-7762
Barry M. Schram	BMS ASSOC	(619) 552-1413
Melanie Hamilton	IIE	(404) 449-0460
Richard L. Storch	U of Wash	(202) 543-5387
David Walker	Portsmouth NSY	(207) 438-2490
Peter A. Scontras	Portsmouth NSY	(207) 438-2365
Ursula Yeo	USCG Yard	(301) 789-1600
		Ext. 324
Peter Mullaly	Portsmouth NSY	(207) 438-2707
Ernie Ellsworth	Portsmouth NSY	(207) 438-1595
Arv Nadkarni	Philadelphia NSY	(215) 897-3766
Walt Hemphill	Philadelphia NSY	(215) 897-3692
Wally Bateman	Science Mgt. Corp	(201) 647-7000
Jack Coleman	Puget Sound	(206) 476-7010
Doug Irwin	Norfolk NSY	(804) 396-8738
Ray McInnis	Norfolk NSY	(804) 396-8691
Dale Rome	DTRC	(202) 227-1380
Al Urrutia	NAVSEA 07011	(202) 746-4477
Larry Brown	The Brown Network	(707) 648-0574
Lynwood Haumschilt	NASSCO	(619) 544-8800
Andy Parikh	NASSCO	(619) 544-8832
Les Sherry	Mare Island NSY	(707) 646-2164
Bill Priess	Mare Island NSY	(707) 646-4513
Ron Hockett	Newport News Shipbldg.	(804) 380-4765
Carl Tarpley	Charleston NSY	(803) 743-5489
Bill Thomas	Charleston NSY	(803) 743-4841
Jimmy W. Fuller	NAVSEA 07011	(202) 746-4477

PANEL SP-8
PLANNING SESSION

September 12, 1989

Meeting Minutes

Draft of SP-8 Planning Session Minutes

John Jessup opened the meeting at 08 00 in the NAVSEA 07 conference room in Crystal City Plaza 5. See Attachment 1 for a list of those attending the meeting. An agenda was set to 1) discuss development of a new Panel Charter, 2) determine ways to improve shipyard participation in SP-8, and to elect a new Vice-Chairman.

Panel Charter

The panel charter that was provided in the meeting handout was determined to be about 1985 vintage. Those in attendance did not feel it would be productive to try to rewrite the charter from scratch since a lot of work had been put into the charter in 1987. A mission statement was pulled from Kurt Doehnert's files (1987 Vancouver Meeting Attachment 2) and it was recommended that Kurt incorporate this into the most recent charter. John Jessup said that he would dig up a copy of the most recent charter available. This newly revised charter would then be an item to vote on for the next meeting.

Guidance on rewriting the charter included deleting the listing of projects, and defining the scope of Industrial Engineering by inclusion of the following functions:

- Systems Engineering
- Manufacturing Engineering
- Process Engineering
- Production Engineering
- Methods Engineering
- Quality Engineering
- Operations Research

In addition to this list of functions, the charter should address Industrial Engineering Activities. The list on page 5 of P. Robinson's NSRP report "Optimal use of Industrial Engineering Techniques in Shipyards" was to be used as a strawman. (See Attachment 2)

Shipyard Involvement in SP-8

The Critical Success Factors that were developed at the Vancouver meeting in 1987 were considered to be viable (Attachment 4). The Panel needs to work harder on the selling of results and maximizing SP-8 participation. Two action items were identified as first steps toward these ends.

First, the panel needs to have a more predictable ~~of~~ ~~evening~~. An outline agenda is to be developed that shows that panels activities for the coming year. This will allow for meetings to be promoted early and pulled together with less effort. Additionally this will institutionalize the QEC question/answer sessions or meeting theme/guest speaker approach that has been used for the last few meetings. 2 Karaszewski volunteered to carry out this action item.

Meeting themes for future meetings include

The Role of Industrial Engineering in Strategic Planning for the Industry Identifying the Elements of Strategic Planning

Is Capital Investment the way to Reduce Cost and Accelerate Deliveries? (based on comments of J Stocker)

The Role of Industrial Engineering in the Environmental Function (based on comments of Admiral Hines)

The Study of Production Planning

The Study of Production Scheduling

The second action item was promotion of the SP-8 Panel to increase shipyard participation. The following roadblocks to participation of shipyards in the panel were listed:

Recall of Projects for Implementation

Communications problem

project Funding Cycle

Contraction of the Industry

We're not selling

A first step in alleviating these blockages was to write an article for the next issue of *NSRF News*. This action item was accepted by Ursula Yeo. This is to be completed by Oct. 31, 1989.

The development of a SP-8 Procedures Manual is to be brought forward at the next meeting. ~~will put~~ will put together a strawman for presentation at the next meeting.

Election of New Vice-Chairman

Larry Brown requested that a new Vice-Chairman be elected due to his recent retirement. Carl Tarpley from Charleston Naval Shipyard was

Trip Report

unanimously elected as the new Vice-Chairman. Mr. Tarpley accepted the position contingent upon his shipyard's approval.

Future Meetings

The next two meetings of the Panel are to be scheduled for January and May 1990. The January meeting was tentatively set for Charleston Naval Shipyard and the May meeting for San Francisco to coincide with the IIE conference. ~~November 1989 - IIE conference~~
~~November 1989 - IIE conference~~ No specific dates were set. The Vice-Chairman is to coordinate the meetings with the Chairman as soon as possible so that the meetings can be announced in the November, 1989 *NSRF News*.

Adjourn

The meeting was adjourned at 11:20.

SP-8 (Day 2)

<u>NAME</u>	<u>ORGANIZATION</u>	<u>PHONE</u>
Kurt Doehnert	NAVSEA 07011	(202) 746-4477
Dave Walker	Portsmouth Naval SY	(207) 438-2490
Richard Storch	Univ. of Washington	(206) 543-5387
Ron Hockett	Newport News Shipbuilding	(804) 380-476
Lawrence Brown	"The Brown Network"	(707) 648-05
Barry Schram	BMS & Associates	(619) 552-1413
Rodney A. Robinson	R-P-M	(603) 436-7762
Carl Tarpley	Charleston Naval SY	(803) 743-548
Andy Parikh	National Steel & Shipbldg.	(619) 544-883
John Jessup	Peterson Builders	(414) 743-5571
Les Sherry	Hare Island Navy SY	(707) 646-2164
Ursula Yeo	U.S. Coast Guard Yard	(301) 789-1600 Ext. 32
Zbigniew Karaszewski	MARAD	(202) 366-5841

Attachment
#2

SP-8 Mission Development

ENCLOSURE (1)

PLANNING NOTES (circa 1987)

ASSUMPTIONS

1. 1. NSRP will continue to operate.
2. SP-8 will continue to operate as a committee.
3. Funding sources may vary.
4. Need to define mission to control panel direction (destiny).
5. Pro-rata funding to end.

TRENDS

1. Industry changes: toward ship repair; dwindling shipbuilding.
2. Declining industry base.
3. Current funding provided by "Navy".
4. Navy is the principal customer.
5. Increasing panel's competitiveness.

INITIAL LIST OF IDEAS

1. Identify I.E. techniques suitable for shipyards.
2. Leader of tech change - emphasis on implementation - integration innovation.
3. Conduct case studies based on I.E. (problems - technique).
4. Provide guidance - I.E. & other managers (forum).
5. Forum for I.E. exchange (all areas),
6. Instill business sense in Engineering effort.
7. Provide NSRP leadership.
8. Personal and professional growth.
9. Become "the authority".
10. Prepare/manage I.E. tech projects.

Aug 1987
After Vancouver

ENCLOSURE (1)

SP-8 MISSION STATEMENT

Lead improvement in the shipbuilding and ship repair industry through Industrial Engineering; focusing on: (1) the total System, (2) implementation, and (3) information exchange.

INDUSTRIAL ENGINEERING ACTIVITY	SHIPYARD SIZE		
	LARGE	MEDIUM	SMALL
Capital Investment Analysis	*****	*****	***
Energy Managment/Conservat ion	*****	*****	*****
Statistical Analysis	*****	****	*****
Prep/Delivery Oral/Writ ten Rpts	*****	****	***
Accuracy Control	*****	*****	**
Methods Improvements	*****	****	**
Computer Integrated Manufacturing	*****	*	*****
Engineering Economy	*****	* * *	***
Human Resources Accounting	****	*****	***
Work Measurements	*****	*****	**
Tools/standards	*****	****	***
Project Management	*****	*****	
Flex Manufacturing/Aut-tion	*****	****	*
Learning Curve Concepts	*****	*****	**
Plant :LayOut	*****	****	
Plant Engineering	*****	****	
Production Planning	***	*****	**
Group Technology - Flow Lanes	*****	***	
Material Requirements Planning	*****	**	*
Manufacturing Engineering	*****	**	**
Production Scheduling	***	****	**
Economics of Production	****	***	**
product Work Breakdown Structure	*****	***	*
Human Factors/Ergonomics	**	****	**
Computer Simulation	*	**	****
Psychology of Sales	****	**	*
Value Engineering/Analysis	***	***	*
Operations Research	**		*
Behavioral Science Application			**

INDUSTRIAL ENGINEERING ACTIVITY PROFILE

Key: The more *'s, the heavier the involvement in this activity.

Attachment
4

(circa 1987)

~~ENCLOSURE (2)~~

IDEA GENERATION

sp-8 CRITICAL SUCCESS FACTORS

- | | |
|-------------------------------------|------|
| 1. Maximum participation. | (13) |
| 2. Know your customer needs. | |
| 3. Measurable results | |
| 4. Info network. | |
| 5. Focus on main needs. | (8) |
| 6. Sell results. | (7) |
| 7. Shipyard implementation. | |
| 8. Focus on management system. | |
| 9. I.E. technology transfer. | |
| 10. Monitor implementation. | |
| 11. Continuous planning program. | |
| 12. Track actual results. | |
| 13. Positive R.O.I. | |
| 14. Continue examining assumptions. | |
| 15. Promote I.E. | |
| 16. Cooperate with other panels. | |
| 17. Dynamic advocate. | |
| 18. Marketing/education. | |
| 19. Design for production, | |
| 20. Focus on basics. | |

IDEA GENERATION
CRITICAL SUCCESS FACTORS

- 21. Generic solutions.
- 22. Research management basics.
- 23. Rapport with other panels.
- 24. Incorporate system science.
- 25. Identify basic problems.
- 26. Integration with other panels.

- 27. Address needs of shipyards. (9)

- 28. Timely results.
- 29. Funding.
- 30. Conduct research.

- 31. Complete beneficial projects. (13)

- 32. Document goals/history.
- 33. Streamline planning/scheduling.
- 34. Focus on pilots and proto.
- 35. High level visibility.
- 36. Analysis failures/successes.
- 37. Leadership through 1.E.
- 38. Follow up after project. --
- 39. self discipline
- 40. Strong stable leadership/membership.

IDEA GENERATION

CRITICAL SUCCESS FACTORS

41. Acceptance of I. E.-
42. Be known and accepted.
43. Generate customer support.
44. Develop shipyard/I. E. curriculum.
45. Marketing.
46. Support.
47. Willingness to share.
48. Educate others on I.E.